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The Mines of Rhodesia.*

BY J. H. CURLE.

Writing of my last visit to Rhodesia, rather less than a year ago, I then made clear the condition of the gold mines there. Although the country has now yielded over four millions of gold, the failure of the mines, in their commercial aspect, has been colossal. The explanation is simple. The determining factor in mining, as in other paths of industry, must ultimately be intrinsic value—which, in the case of mining, is the ore in the mine. This factor has been absent, I believe, from every Rhodesian mining flotation. The majority of the mines floated have been wretched little concerns, with a small reef and a short ore-chute. A mine of this sort is worthless to any distant body of shareholders, for not one in fifty ever returns the actual cash sunk in its equipment. The only chance for such a mine is that it should fall into the hands of a small syndicate of working men, who, by their own labor and the use of second-hand machinery, may, by picking out the best patches, gain a small profit. And yet all these worthless little mines have been capitalized by the amateur financiers responsible for their flotation at an average of something like £130,000.

The larger type of Rhodesian mine, where at least the indications of permanence were demonstrated, was also ruined by this wretched band of mining amateurs. Before these mines were proved to any extent they were floated, all for huge capital, and the collapse of many of them, almost inevitable as it was, wrought still greater damage to Rhodesian shareholders.

Can this industry rise on the ashes of its dead self to any sort of commercial value? Frankly, my opinion is that the issue is still in doubt, but I will put the factors for and against, and allow the reader to draw his own conclusions. The country's output of gold is now rising steadily, and is within measurable distance of £2,000,000 a year. This fact is alluded to as a sign of prosperity, but it has really no connection with the commercial value of the mines. As more mines start producing, the output must continue to go up; but if many of these mines are working at no profit, or if their profits are being applied to the paying off of big debts, or if—more important still—their ore reserves are insignificant and their lowest workings looking doubtful, the mere increase in the country's output of gold can in no way be said to reflect on the commercial value of the individual gold producers.

The hopes of the industry rest, so far as I can see, entirely on the larger type of mine. There are about 40 small mines, which, I think, are not even worthy of mention, and I shall be surprised if any one of these should ever pay back the money sunk in its development and equipment. Among the larger mines, some have already turned out disappointments; but it is possible, on a low-grade basis, that even these may eventually be worked at a small profit, although I can assign little or no commercial value to them at present. The larger gold-bearing orebodies of Rhodesia are owned by the following mines: Giant, Jumbo, Penhalonga, Athens, Falcon, Sabiwa, Ayrshire, Rhodesian Banket, West Nicholson, and Wanderer. Between these and the small 10-stamp mines come Globe and Phœnix, Selukwe, Killarney Hibernia, Geelong, Surprise and Bonsor.

Of these sixteen mines, at present I consider the commercial value of eleven to be doubtful. The remaining five have some commercial value—that is to say, they will earn some profit—but whether these mines (Giant, Penhalonga, Rhodesian Banket, Sabiwa, Globe and Phœnix) are worth their respective market valuations, I doubt. If they were valued without sentiment, relatively to their exposed ore, they would stand at lower prices. The Giant is a good mine to 500 ft., with a lode 12 ft. wide. There is reason to expect that it will at least return with interest the money sunk in it. Penhalonga will increase its capacity, I understand, to 14,000 ton a month, on which basis it should earn a fair profit. I have no recent estimate of reserves, but they should stand at half a million tons before this scale of working is justifiable.

Rhodesian Banket is a misnamed mine, in so far as the ore is not banket, but a coarse conglomerate of hornblende, schist and granite. No doubt this formation extends for miles, and it may be that good patches of ore will recur along this stretch; but to assume that the occurrence or regularity of the gold will in any way compare with the Rand conglomerate seems a wildly unjustifiable idea. As described to me, the Eldorado mine of the Banket Co. consists of a central core of very rich ore, with value gradually becoming poorer as the drives extend from the center. Should this hold in depth, it would, no doubt, turn into a good mine—perhaps the best yet found in Rhodesia. But even admitting this, and allowing for the prospects of other patches being discovered along the course of the lode, I fail to see why sentiment should be allowed to usurp the place of actual blocked-out ore, and of this commodity there cannot yet be any very great amount.

The Sabiwa has possibly the making of a big low-grade mine. I hear that those who control this venture are again contemplating floating off the extension of this orebody as a separate concern, thereby duplicating managerial expenses, and increasing directors' fees in an unjustifiable manner. When will these people learn that it is the shareholders' turn to receive some little profit out of the undertaking?

Globe and Phœnix is the only Rhodesian mine in the long list which has returned the actual cash spent on it. The mine is doing well at present; but, on the figures of the last report, the ore reserves were in absurd relations to the market value of the mine.

So much for what look like the most promising gold mines. Among the remainder, I would single out the adjacent Athens and Falcon—which should be consolidated into one company—as the most hopeful. This orebody is low grade—worth in bulk rather over £1 a ton—but it carries a little copper, which, unless it can be removed by concentration, will affect the extraction by cyanide. On the other hand, the lode is of enormous size, facilities are good, and, granted success over the metallurgical problem, there is the making here of a big mine.

The Jumbo, which a year ago was thought the most promising mine in Rhodesia, has not continued to hold that place. Someone had blundered, either in sampling or assaying the ore, and a revaluation of the mine showed what had happened. In the meantime, the future of the mine is in considerable doubt, but there is a certain amount of payable ore exposed and the prospects, especially on an orebody of such dimensions, are not hopeless.

As regards the prospects of Rhodesian mines other than gold, these are somewhat nebulous. In northern Rhodesia there is, without doubt, a lot of copper; while the zinc-lead deposit of the Rhodesian Broken Hill Company is also of great magnitude. But in connection with mines of this type, the economic factor assumes immense importance, and it seems to me that their great distance from a seaport must strain the economic factor severely. I do not wish it to be inferred that these copper and zinc mines north of the Zambesi cannot be made to pay; but it will certainly be some years, and then only after a very great expenditure on railways and equipments, before they will do any real good. If hearsay evidence goes for anything (and very often in mining it does not), the copper and other deposits of the Tanganyika Concessions Company must be of unusual value and magnitude. It is well to remember, however, that these are located in the Congo territory (except several of lesser value), and that neither Rhodesia nor its railway is likely to derive great advantage from them.

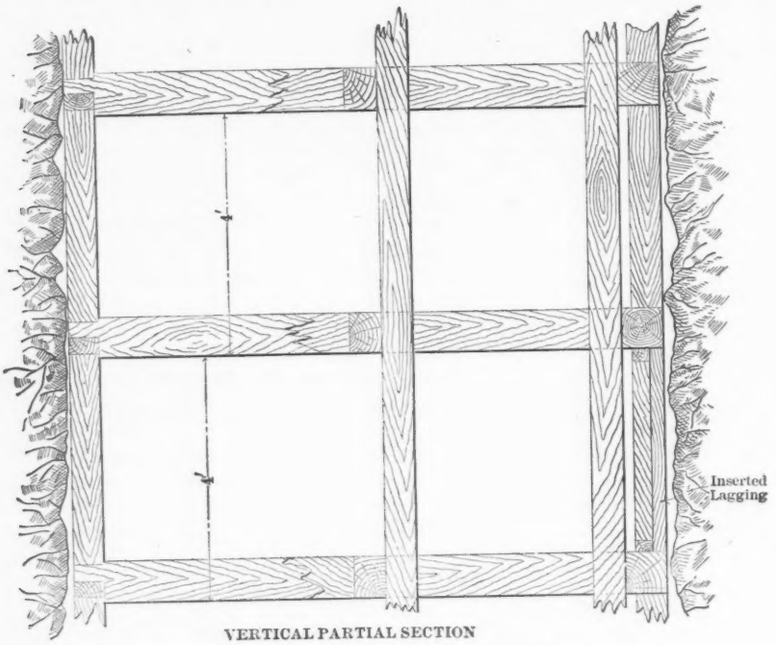
Finally, I realize that for the opening up of this great country, which in every sense is a praiseworthy end to strive for, sentiment and possibilities must commonly take the place of facts and of ore reserves. The world is large enough for both types of mind implied; and though I myself (and, no doubt, many who read this) ask for a better security for our money, there are also thousands who do not, and who are prepared to go in on the gambling basis.

*An article published in *The Economist*, Oct. 7, 1905.

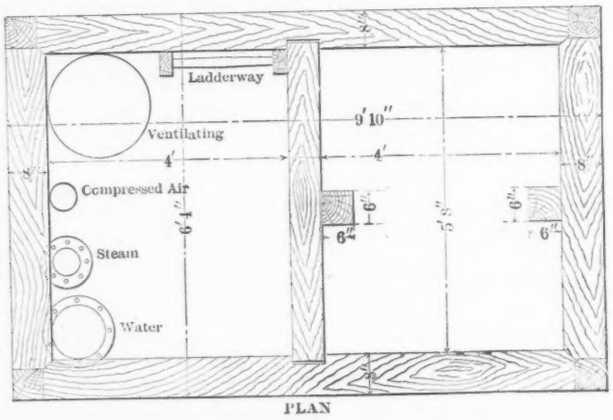
Drainage of the Cripple Creek District.*

BY D. W. BRUNTON.†

A study of existing conditions, of records, and of reports made from time to time, shows that the water in this district is "ground water"; *i. e.*, water that is stored in the rock, replenished from the surface and not by springs from beneath.



VERTICAL PARTIAL SECTION



PLAN

When the natural water level is lowered (either by pumping or tunnel drainage) the flow toward the pumps or tunnel takes place through every available opening, and even through the rocks themselves. When the depth of drainage below the natural water-level is increased, the available drainage area is proportionately enlarged; the velocity of the flow is also increased in direct proportion to the head; in other words, the greater the pressure the greater the flow.

The annual precipitation (as shown by records kept by Mr. Victor G. Hills) is from 15 to 18 in., but there is nothing to indicate what percentage of this finds its way into the rocks and what is "run-off."

A recent heavy shower nearly buried the end of the Cripple Creek drainage tunnel with an immense mass of gravel and boulders, and in locating a tunnel in either of these cañons particular pains should be taken to keep the portal and tunnel buildings at a sufficient height above the stream to prevent any possible damage or interruption from floods.

Water now Pumped from the District.—This is shown as follows:

Gold Coin	500	gal per min.
Strong	250	" " "
Vindicator	153	" " "
Golden Cycle	275	" " "
Total	1,178	" " "
Flow from Cripple Creek Drainage Tunnel	4,115	" " "
Grand total	5,293	" " "

Quantity pumped, Jan. 17, 1903 (report of V. G. Hills): Isabella Lee, 50 gal.; Vindicator, 480 gal.; Gold King, 140 gal.; El Paso, 600 gal.; Strong, 200 gal.; Stratton's Independence, 300 gal.; Gold Coin, 750 gal.; Saint Patrick, 30 gal.; total, 2,250 gallons per minute.

At that date the water level on the western portion of the district was about 9,028 ft. elevation; this was maintained until the Cripple Creek drainage tunnel cut the water courses on Nov. 22, 1903, since which time the water level has gradually fallen off 137 feet.

Permeability of the Rocks.—The productive area is roughly coincident with the core of eruptive rocks occupying the vent of the old crater and the distance to which the fissuring extends into the surrounding granite. The eruptive rocks (excepting some phonolite and basalt) are extremely porous. There are also open fissures along dikes, in veins, and often directly through the country rock; these fissures are known among miners as "water courses." They have, in common with the vein system, a general north and south direction, but vary somewhat, so that the drainage of any one section will affect the entire area.

At present, the group of mines on the eastern and southern sides of the district (including the Vindicator, Golden Cycle, Gold Coin, Strong and Stratton's Independence) are but little affected by the drainage which has been going on in the central and western portion since the water-bearing fissures were cut by the Cripple Creek drainage tunnel. The fact that they do not connect at the present water level is no certain indication that they would not at greater depth, as the plug of eruptive rocks filling the crater of the volcano probably narrows as depth is gained. A drainage tunnel, passing through the granite rim into the most highly fissured eruptives, in time would probably drain the entire district.

This opinion is shared by Messrs. Mudd and Lindgren in their respective reports.

It is generally conceded that the granite rim surrounding the volcanic area carries little water, and that the water which is being handled by the pumps and by the Cripple Creek drainage tunnel is drawn almost entirely from the eruptive rocks. Some idea of the immense amount of water carried in these rocks may be gathered from the fact that the removal of 4,115 gal. per minute is lowering the water level in the central and western portion of this underground basin at the rate of only 4 ft. per month.

Amount of Water Removed to Lower Water Level One Foot.—Since the completion of the Cripple Creek drainage tunnel, A. C. Jaquith has kept a record not only of the amount of water flowing from the tunnel, but also of the rate of recession of the water in the principal shafts. In the latter part of 1903 the amount of water necessary to lower the water level one vertical foot was 25,204,000 gal. This amount raised steadily as the drainage area increased, until Sept., 1904, when it reached 58,109,000 gal. for one vertical foot drained; since then the relation of discharge to drainage has remained practically constant.

Comparative Costs of Pumping and Tunneling Schemes.—Any attempt to drain the entire district even by the most modern centralized pumping station,

*A report prepared for a committee appointed by Cripple Creek mine owners.

†Mining engineer, Denver, Colo.

would prove a complete failure, as the expense entailed would be prohibitive.

Mr. Jaquith has calculated that to drain the district to a depth of 730 ft. below the Cripple Creek drainage tunnel by pumping would cost 6.6 times as much as by tunneling. Even if the cost of the two systems were the same, the tunnel would be preferable as it would take care of itself without any expense.

Most Desirable Course for Tunnel.—The most effective way to tap the greatest number of fissures in the least distance would be to run a tunnel in an east and west direction; to afford the *earliest* relief to all portions of the district, it should run through the center, which practically means that it should cross the eruptive area from the El Paso to the Vindicator. I believe that it would not be necessary to crosscut the entire district in order to drain it; although the combined advantages of drainage, ventilation and prospecting would justify such an expenditure. Another advantage of tunneling over pumping, even where both can be effected at equal costs, is the freedom from breakdowns and stoppages, either by accident or design as often happens during strikes.

History of Tunnels in the District.—Four tunnels have already been driven: the Blue Belle, Ophelia, Standard and El Paso. These tunnels were run in the order named, each, respectively, at a considerable distance below the preceding. As each successive tunnel struck the water bearing fissures it immediately drained the tunnel above it; at present, only the El Paso is discharging water. The elevation of tunnel portals and the amount of water cut by each are shown herewith.

	Elevation.	Flow. Gal. per Min.
Blue Belle	9,342	200-300
Ophelia	9,275	1,000-3 000
Standard	9,034	1,000-12 000
El Paso	8,790	1,800-6,800

Efficiency of Tunnel Drainage.—The effect on the water levels (described in the report of Mr. Mudd, and in the report of Victor G. Hills to the Portland Mining Company, Jan. 19, 1903) was almost immediately felt in the mine workings over an immense area; it seems probable that the mines on the extreme south and east, whose water level was apparently unaffected, must have derived considerable benefit by the lowering of the water level to the north and west of them; each of these mines is now pumping much less water than before the Cripple Creek drainage tunnel tapped the district; in some instances, as at the Portland and Independence, the pumps have been entirely stopped.

Difference of Cost of Mining in Wet and Dry Ground.—The expense of pumping is by no means the only measure of the increased cost of mining in wet ground. When drifts, winzes and raises are driven where the miners can work in comfort, wearing ordinary clothing, they can do at least 33% more work than when weighed down with rubber coats and boots. In addition to this, with Cripple Creek ores, the loss in "fines" is certainly much less in dry than in wet mining. Deep-level drainage would show a difference of at least 20% in favor of dry against wet mining.

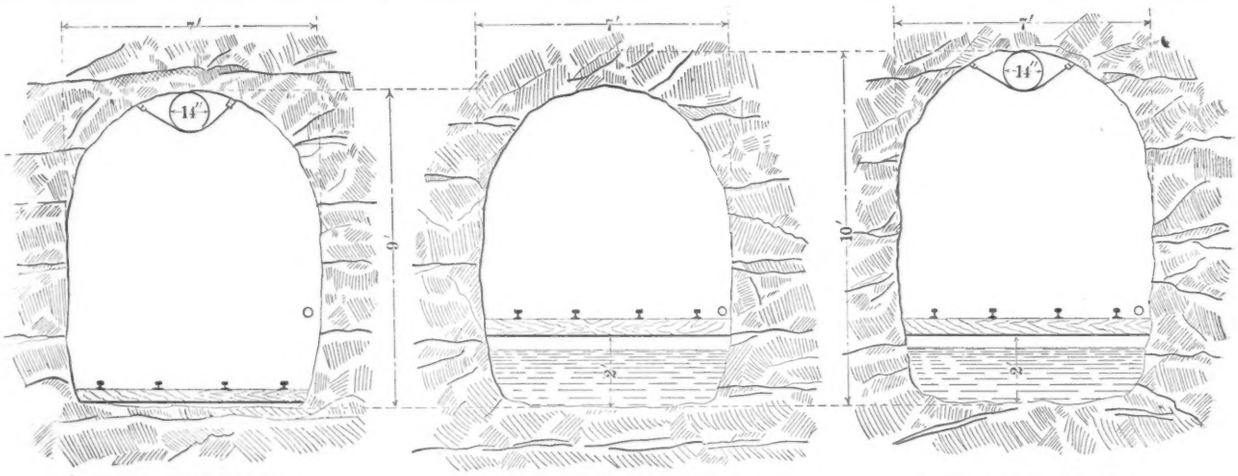
Depth at which Drainage Tunnel should be Driven.—Four drainage tunnels have already been driven, each in a measure parallel with the other, but ideas change with conditions. Thus the El Paso tunnel was driven 244 ft. below the Standard, but it did not reach its maximum flow until May 1, 1904; yet another tunnel is already required. Commercial considerations demand that the proposed tunnel shall be run at sufficient depth to obviate absolutely the necessity of ever having to drive another.

On the other hand, it is well known that all rocks (especially volcanic ones) usually soften somewhat in depth; and that under the ever-increasing pressure of superincumbent rocks, as depth is gained, there is also a tendency for the fissures to narrow. Considering the thickness of the mineralization zone, and the comparative shallowness of the present workings (granting a steady decrease of fissuring and mineralization with depth), complete extinction is further off than the pessimists would have us believe; the commercial limit is apt to be reached before the geological limit.

Within reasonable limits, the greater the depth at which the water-bearing rocks can be tapped, the more rapidly and thoroughly will the eruptives be drained to the outer edge of the rim. No harm would be done if the district should be drained below some of the smaller veins, as it seems probable that some of the more highly mineralized fissures will continue beyond a depth at which it will be commercially profitable to drive a tunnel.

Comparison of Tunnel Sites.—The different ravines to the south and west of the district afford excellent tunnel sites. At its junction with Four Mile, Wilson creek is lower than Cripple creek; but at the level at which it would be desirable to run a drainage tunnel, the shortest routes to the productive area from any given elevation are found in Cripple creek cañon. Messrs. Davis and Byler made a survey down Wilson creek to an excellent site at an elevation of 8,100 ft.; the length of a tunnel by the route from the portal to the Gold Coin shaft would be 17,900 ft.; and to the igneous rock, where it would begin drainage, 20,500 ft. The same result can be accomplished in Cripple creek with a tunnel 5,000 ft. shorter. Moreover, any tunnel from Wilson creek would have the disadvantage of passing under Straub mountain at 1,200 to 1,500 ft. below the surface, thereby prohibiting the use of intermediate shafts and necessitating driving from the portal only. The length of time required would effectually prohibit the Wilson creek route.

Excellent tunnel locations are found in Cripple creek cañon; just below Cape Horn, at Gatch Park, and below Window Rock, the conditions afford good places for operations. In comparison with the magnitude of the work, the cost of grading near the mouth of the tunnel scarcely needs to be taken into consideration; the necessary buildings can be erected on



TUNNEL WEST OF SHAFT
During Construction

TUNNEL WEST OF SHAFT
After Completion

TUNNEL EAST OF SHAFT

posts, and the ground filled up with waste to the tunnel level in a short time.

Only a few small springs show in Cripple Creek cañon; this indicates that no water of any consequence need be expected in driving the proposed tunnel. This conclusion is also confirmed by the Big Twenty tunnel, which has been driven into the mountain below Sentinel Rock for a distance of 1,300 ft. without finding any water.

From each of the above-mentioned sites the tunnel would pass through coarse-grained granite for the entire distance to the Black Belle water courses; no better material for driving in than this could be selected. The Cripple Creek drainage tunnel is now flooded nearly to the roof by an accumulation of débris near its mouth; careful inspection of the Big Twenty tunnel (in identical rock) showed few drill holes and "guns," yet the rock stood the entire 1,300 ft. without a single stick of timber.

The grade of Cripple creek increases considerably as it descends toward Oil creek; consequently deep-level tunnels will gain more depth per ft. of length than shallow ones. Again, as the new tunnel will be driven under the old one for over a mile, in which distance no additional drainage depth is gained, it follows that this mile of practically dead work forms a smaller proportion of the total length in the long deep-tunnels than in the shorter, shallower ones; and that the deeper we drive the proposed tunnel, the less will be the cost per vertical foot of ground drained.

A comparison of the three sites selected, the cost of driving, and the length of time required to complete the tunnel to the eruptive rocks, are given herewith; also a synopsis of the principal figures.

Estimated Cost of Driving Tunnel from Below Cape Horn, Elevation 8,160 ft., to Main Water-Course.—Distances: Portal to El Paso shaft, 12,840 ft.; portal to Black Belle water-course, 13,840 ft.; portal to tunnel shaft, 8,840 ft.; depth below portal of Cripple Creek drainage tunnel, 630 ft.; depth of tunnel shaft, 650 feet.

Costs:

Shaft, sump and station	$30,000
Portal to shaft workings, 5,500 ft. at $20 per ft.	110,000
Shaft workings, 6,680 ft. at $25 per ft.	167,000
Shaft workings to Black Belle, 1,660 ft. at $22.50	37,350
Road, buildings and depreciation of machinery	35,650
Total	$380,000

Time required: Shaft, sump and station, 216 days; tunnel workings from shaft, 334 days; tunnel workings to Black Belle, 166 days; total 1.97 years, or 716 days..

The depth gained under Cripple Creek drainage tunnel is 605 ft.; the cost per vertical ft. of depth drained is $628.

Time Required to Drive Tunnel from Gatch Park, Elevation 8,020 ft., to Main Water-Course.—Distances: Tunnel portal to El Paso shaft, 14,550 ft.; El Paso shaft to main water-course, 1,000 ft.; portal to tunnel shaft, 10,570 ft.; depth of tunnel shaft, 800 ft.; elevation of portal, 8,020 ft., or 753 ft. below portal of Cripple Creek drainage tunnel. Time required to sink tunnel shaft with sump and station (allowing a daily rate in shaft of 3½ ft.), 261 days.

While this was being done, the heading from the portal would have been in operation 261 days, and (at an average rate of 10 ft. per day) would have been driven 2,610 ft. This would leave a gap between the portal heading and the bottom of the shaft of 7,960 ft., which (by combined attack from the tunnel shaft and the portal heading) could be driven through in 398 days. During this 398 days, the heading from the tunnel shaft to the eastward would have advanced 3,980 ft., thus reaching a point 1,000 ft. from main water-course, when connection is made between the portal and shaft workings. This 1,000 ft. would be driven in 100 days, making the time required for effective drainage to begin, as follows: Sinking tunnel shaft, sump and cutting station, 261 days; making connection between shaft and portal headings, 398 days; connecting tunnel-shaft workings with main water-course, 100 days; total time, 759 days, or 2.1 years.

Cost of work:

Sinking shaft and sump, 820 ft. at $40 per ft.	$32,800
Cutting station	3,200
Driving tunnel heading 6,590 ft. at $20	131,800
Driving tunnel from bottom tunnel shaft, 7,960 ft. at $25	199,000
Driving tunnel heading 1,000 ft. at $22.50	22,500
Buildings, road and depreciation of machinery	40,700
Total	$430,000

The depth gained would be 740 ft.; the cost per vertical ft. drained, $581.

Should it be necesary (in order to obtain drainage of the eastern part of the district) to drive across to the Vindicator shaft (11,640 ft.), this could be done in 1,164 days (3.2 years) at $25 per ft., or $291,000. This should not be all charged to drainage, as the crosscut would be of value both for prospecting and ventilation.

Cost of Driving Tunnel from below Window Rock (Elevation 7,660 Ft.) to Black Belle Water-Course.—Distances—Portal to El Paso shaft, 17,200 ft.; portal to Black Belle, 18,200 ft.; portal to tunnel shaft, 12,960 ft.; depth below portal of Cripple Creek drainage tunnel, 1,130 ft.; depth of tunnel shaft, 1,140 feet.

Tunnel shaft, sump and station	$50,000
Tunnel from portal to shaft workings, 8,180 ft. at $20 per ft.	163,600
Tunnel, shaft portion, 9,020 ft. at $25 per ft.	225,500
Tunnel shaft workings to Black Belle, 1,000 ft. at $22.50 per ft.	22,500
Road, buildings and depreciation of machinery	48,400
Total	$510,000

Time Required.—Tunnel shaft, sump and station, 367 days; connection between portal heading and shaft workings, 451 days; tunnel shaft workings to main water-course, 100 days; total, 918 days, or 2.5 years. The depth gained by Cripple Creek drainage tunnel, 1,090 ft. Cost per foot of depth drained, $468.

Rate of Driving.—In the preceding estimates, it has been assumed that the tunnel shaft could be sunk at a rate of 3½ ft. per day, and that an average daily rate of progress of 10 ft. could be maintained in the headings by employing skilled tunnel men and 3½ to 4-inch air drills. This is better than was made in the Cripple Creek drainage tunnel, but that was a small tunnel, driven by miners using 3¼-in. air drills. In Europe, in the Arlberg and the Simplon tunnels, 15 or 18 ft. per day has been maintained over a period of years. Even in this country, drifts have often been driven in granite at a rate of 360 ft. per month. In two long tunnels recently completed in California, rates considerably over 10 ft. were maintained during the entire progress of the work.

DETAILS OF PROPOSED TUNNELS.

Location of Portal.	Elevation of Portal.	Depth Below C. C. D. Tunnel.	Distance to El Paso Shaft.	Distance to Main Water Channel.	Distance from Portal to Tunnel Shaft.	Depth of Tunnel Shaft.	Time Required.	Cost.	Depth Gained.	Cost per Vertical Ft. of Depth Drained.
Cape Horn	8,160	630	12 840	13,840	8,840	650	1.97 years	$380,000	605	$628.00
Gatch Park	8,020	770	14,550	15,550	10,570	880	2.1 "	430,000	740	581.00
Window Rock	7,660	1 130	17,200	18,200	12,690	1,140	2.5 "	510,000	1,090	468.00

In the Cowenhoven tunnel (when rock conditions were favorable) from 300 to 427 ft. per month was easily maintained. To do this, however, special pains must be taken with ventilation, transportation and drainage — three all-important branches.

Expediting the Work.—The early completion of the new drainage tunnel is urgent. In the portal and shaft heading toward the west (where no water is expected until after connection shall have been made) mucking from the face will be easier and quicker if the ties are laid in the bottom of the tunnel (instead of above the water grade, where they will have to be placed before the water fissures are opened up). After connection is made between the portal heading and shaft workings, the plant at the tunnel shaft will provide ventilation for the heading to the east, and thus permit the pipe between the shaft and portal to be removed and used again elsewhere. If this pipe is removed before the track is raised it is evident that this portion of the tunnel need not be over 9 ft. in height, instead of 10 ft., as will be necessary where the ventilating pipe must be used after the ties have been placed above the water level.

No great speed in tunneling can be obtained without the active co-operation of

the workmen; to this end (as men cannot be expected to perform extra labor without extra compensation) some means of interesting them in rapid driving must be adopted. The most successful plan yet adopted for this purpose is what is known as "the bonus system," in which all grades of employees are paid the standard wages of the district, plus a certain amount for each foot above two hundred driven during the month. If this figure is placed at $6 per ft., and if 10 men are employed on each shift in each heading, the bonus paid each man over and above his daily wage, if 300 ft. were made per month, would be $20; and $40 if 400 ft. were driven during the month. This system has given excellent satisfaction to both employers and employees where it has been adopted; at the same time the speed rate is raised from 33 to 50%, without increasing the cost per running foot driven.

Size of Tunnel.—On coarse blocky granite, such as the tunnel will encounter, the maximum rate of speed cannot be reached in an opening less than 7 ft. in diameter; this establishes the width once and for all. But drainage below the tracks, and room for ventilating pipe, workmen and tunnel cars above it, will increase the tunnel height to 10 ft. While it is possible, by putting in sidings, to remove the waste on a single track, it is more expeditious and cheaper in the end to use double track throughout.

Considering the hardness of the rock and the purpose for which the tunnel is being driven, a section like that shown (Fig. 2) would probably be cheapest and best.

The Tunnel Shaft.—It is not expected that much water will be encountered in the tunnel shaft and the headings driven from it, but it would be unwise to sink a shaft 1,140 ft. deep without making provision for pumping. The headings will be driven in both directions from the bottom of the shaft; at the most rapid rate, the waste hoisted would not exceed 200 tons in 24 hours. This could readily be hoisted in a single compartment and leave abundant time for handling men and materials. The pumping compartment should be 4 by 5 ft. to give sufficient room for steam, water, compressed air and ventilating pipes, and for a ladder way. Timbers need not be over 8 ft. by 8 in., and should be placed 4 ft. apart, center to center; lagging will not be necessary, except in a few places; it will be better to have the timbers blocked securely against the walls and the lagging placed between the timbers as shown in Fig. 1.

Grade.—At times the tunnel will carry from 10,000 to 15,000 gal. per min.; it is evident that the water-way must not only have a large cross-section, but considerable grade. A grade of 1 foot in 300 is recommended.

Haulage.—Four methods of tramming are in common use underground, viz.: By men, mules, electric and air locomotives. For distances over 1,000 ft., man power is too expensive. For temporary work (such as drainage tunnel driving) mules are usually employed. In the present instance, the section adopted renders their use impossible without planking the entire width of the tunnel, both between and outside the tracks.

Electric motors furnish the cheapest and most efficent method of underground haulage; but where transportation is to be discontinued immediately after the tunnel is completed, it scarcely seems worth while to go to the expense of bonding the rails and putting in an underground trolley wire; moreover the water, at and near the contact, would render insulation difficult.

On the other hand air locomotives would furnish excellent haulage, the only objection being the cost of the locomotives and the high-pressure air-compressors necessary to charge them.

On the whole, it would probably be cheaper to plank the tunnel and use mules, which in spite of their many disadvantages, possess one point of undoubted superiority over locomotives, viz.: they can step across the tracks at the headings, thereby avoiding the necessity of maintaining switches near the face.

Power Plant.—The water flowing from the Cripple Creek drainage tunnel could easily be utilized to operate an electric power plant; for this purpose the El Paso Company has already surveyed a ditch and taken out water rights at a point below the proposed Gatch Park tunnel. If one of the other sites mentioned should be selected, suitable locations for a ditch and pipe line could be obtained. By locating the inlet to the ditch below the point selected for the new tunnel, the water now flowing from the Cripple Creek drainage tunnel could be deflected into it. After the completion of the drainage tunnel, the power would undoubtedly find a ready sale in the district.

Ventilation.—This problem, one of the most important adjuncts to rapid tunnel work, has long since been completely solved. No difficulty need be expected from failure to clear the tunnel of smoke within a few minutes after each round of shots is fired. Small single openings (like mine drifts and drainage tunnels, which, from the nature of the case, necessitate the use of small ventilating pipes either as an inlet or outlet) cannot be successfully ventilated with a fan blower, as the friction-head increases, and the volume of air delivered diminishes, with the length of pipe. Workings of this kind should always be ventilated by a force blower, in which case the volume of air delivered or removed remains the same no matter what the increase in the length of the ventilating pipe may be; the only difference being that the power required to operate the blower increases with the distance. As power forms but a small item in the cost of ventilating, this increase is immaterial, while the results gained by this system are everything that can be desired. In the Cowenhoven tunnel, two miles from the face, by this system the air was kept almost as pure as at the surface.

In removing foul air from a tunnel with a ventilating pipe, it is evident that either the pipe or the tunnel may be used as the inlet. Where speed is the first consideration, the use of the tunnel for the outlet, driving fresh air through the pipe over the drill men, is the most efficient. Where heavy charges of powder are used, and much poisonous gas is imprisoned in the muck and released as it is shoveled into the cars, a stream of fresh air blowing into the heading protects the workmen from its bad effects; but where this system is used there is always a heavy bank of smoke moving slowly out of the tunnel for some hours after the shots have been fired, through which the trammers must pass.

Conclusions.—Assuming the cost per vertical foot of ground drained as the same for each of the tunnels heretofore considered, if a balance is struck between the desirability of a deep-level tunnel (with its long life and certainty of drainage for all portions of the district) and the necessities of many of the mines now working at or near the water level, it would result in the choice of the tunnel from Gatch Park (elevation, 8,020 ft.). However, when we consider that the tunnel from Window Rock would give an additional 350 ft. greater depth at an additional cost of $80,000 (or only $228 per additional vertical foot of ground drained), it will be seen that this is an advantage too great to be foregone, and should lead unhesitatingly to the selection of the deep-level tunnel.

If the funds of the association, and the urgency of some of the mines, will not permit the selection of a tunnel site at elevation 7,660 ft., then a choice must be made which will meet the conditions imposed; in which case, either the tunnel from elevation 8,020 ft., or that from elevation 8,160 ft., will fulfil all requirements for many years to come. In making the selection, it must not be forgotten that provision must be made for the future as well as for the present; the deeper the tunnel is driven, the less will be the cost per vertical foot of ground drained throughout the entire district.

In respect to tonnage, Parral is one of the largest ore producing districts of Mexico, if not the largest. Three of its important mining companies are controlled in New York and Philadelphia. The United States Mining Co. is a Philadelphia concern, while the Parral Corporation and the Quebredillas Mining Co. have their offices in New York.

Coal Mine Accidents in Great Britain.

The total number of persons employed at mines and at the quarries in the United Kingdom and the Isle of Man during the year 1904 was 974,634, of whom 877,057 were employed in or about mines, and 97,577 in or about quarries. Of the 877,057 persons employed at mines, 698,967 worked underground, and 178,090 above ground; of the latter, 5,748 were females. Compared with the preceding year, there is an increase of 4,650 males working underground, and an increase of 418 males and 100 females working above ground, making a total increase of 5,168 persons. Ninety per cent of the increase occurred at coal mines. At iron and other mines, there was an increase of 559 males, and a decrease of 52 females.

There were 1,017 accidents in and about mines and quarries, resulting in the loss of 1,090 lives. In comparison with the figures for 1903, there is a decrease of 13 in the number of fatal accidents, and 7 in the number of lives lost. In coal mines, 1,017 separate fatal accidents, causing the loss of 1,055 lives, were recorded, and 110 acidents, causing the loss of 112 lives, happened at quarries. There was an increase of 6 in the number of fatal accidents in metal mines, as compared with the returns for 1903.

The average death-rate of underground workers in mines in 1904 was only 1.23 per 1,000 miners employed. This is the lowest number ever recorded, and is an eloquent tribute to the wisdom of the Government mine regulations and the efficiency of the supervising engineering staff. The acident report may be summarized as follows:

	Coal Mines.	Metal Mines.	Quarries.	Total.
No. of employees..... ...	847,553	29,504	97,577	974,634
No. of fatal casualties...	1,017	31	110	1,158
No. of killed	1,055	35	112	1,202
No. killed per 1,000 employees.....	1.24	1.18	1.14	1.23

More than 48% of the acidents were caused by falls of ground, 28% miscellaneous causes underground, 13.6% happened on the surface, 8% occurred in shafts, while explosions of firedamp and coal dust were responsible for only 2 per cent.

The reduction of the death-rate from explosions in collieries has shown a remarkable decrease in 30 years. It varies from year to year, as a single great explosion may send the number of killed to a high point. Last year the number killed by explosions was only 2; the highest number reported in the 30 years was 140, in 1878. It is more than a coincidence that the Explosives in Coal Mines Orders, which regulate the use of explosives in collieries, came into force in 1896, and that the number of deaths has decreased steadily since that year.

When the record of accidents in the the collieries in Pennsylvania is compared with the British statistics, it will be clearly seen that the complaints of the chief of the Department of Mines, regarding the inadequacy of the State mining laws regulating coal mines, are based on a solid foundation. In 1904 there were 316,899 persons employed in coal mining in Pennsylvania, and 3,095 accidents were reported, of which 1,131 terminated fatally. In other words, 9 out of every 1,000 men engaged in the coal mines were fatally injured, as compared with only 1.24 per 1,000 in Great Britain.

Safety Lamps.

It is almost inconceivable that underground workers in fiery coal mines should still tamper with their safety lamps, thus exposing, not only themselves, but their comrades to the risk of accident and death. Yet in the past a fertile cause of firedamp explosion has been the opening of lamps, in which the screw method of attachment is used. *Colliery Guardian* comments on the necessity of making this carelessness impossible:

As several English mine inspectors point out, it requires little skill to open these lamps which can ordinarily be closed without detection. The fact that there are special rules prohibiting this tampering seems to be no deterrent. Colliery owners in Great Britain generally are disposed to recognize this danger, and are adopting the lead-rivet lock, which cannot be opened without detection. In many districts the old screw-lock lamps have been entirely replaced by the more secure pattern; and in others, the former type is used only by responsible persons. However, there seems to be no reason why even the officials should not have their lamps replaced by the modern pattern.

There still remain some British districts in which the change of lamp is proceeding slowly. Thus in the Midland region, out of a total of 66,829 lamps, 22,701 (or nearly one-third) are of the screw type. In the Cardiff district, on the other hand, with about the same total of lamps, about 97% possess the lead-rivet lock.

Another point to which attention should be directed is the laxity which prevails with regard to the warning "cap," indicating the presence of firedamp. On many occasions firedamp has existed in the working-places, with a distinct "cap" showing on the lamp flame, while the men were not withdrawn in accordance with regulations. In all cases the excuse was that the appearance of the gas was sudden and unexpected; it is probable that the officials were hoping to tide over the danger and avoid the loss of time which the withdrawal of the men would cause.

It is to be regretted that so many, officials and workingmen alike, instead of rigidly complying with the regulations, seem to think that they can deal with firedamp in their own way; and that instead of expecting to find gas as they go through the mine and acting in the prescribed manner, they take it for granted that there is no danger. It is undoubtedly this reckless attitude which has been responsible for a number of explosions.

An interesting fact is noted in an inconsistency in the evidence afforded by "gas caps" on the lamp flame. When colzaline spirit lamps are used it may happen that a "gas cap" will show upon these, when none is shown upon the colza oil lamps used by the officials for examination of the working-places. It should be compulsory to use the more sensitive lamp.

Also, there is the question of naked lights, which are still used in many mines in which gas explosions take place. This matter is a serious one for owners on account of the increased cost, an allowance of about 7½% on wages being necessitated upon the introduction of safety lamps. It is often a difficult question to decide how far the presence of a small quantity of gas may be rendered innocuous by good ventilation.

However, the men ought to forego any claim to increase of wages on using safety lamps, which would certainly diminish the danger to themselves.

The men themselves are often indifferent to the dangers of explosions. Owing to the poor light given by a Davy lamp in one district, the men habitually carry, in addition, a naked light to travel with. The use of such recklessness with naked lights accounted for 23 accidents from firedamp explosions last year in east Scotland.

Metallic Calcium.

The first regular meeting of the New York section of the American Chemical Society this year was held at the Chemists' Club, Oct. 6, 1905. Among the papers presented was an interesting improvement in the preparation of metallic calcium, by J. B. Whitney and S. A. Tucker. Goodwin's method of the electrolysis of fused calcium chloride is found unsatisfactory in some particulars. In particular, the temperature of the iron cathode collector must be kept down. This is done by a water cooler; the yield was increased to 60%. Also the iron cathode was enclosed in a graphite bell to prevent oxidation and chlorination of the metallic calcium; but this device is not entirely satisfactory. Samples of metallic calcium were exhibited; they resembled short, irregular, solid cylinders, like the poorly worked samples of a beginner in wood turning. The metal, however, showed the characteristics of calcium in cutting through the oxidized crust. The samples were not preserved under kerosene, but in wide-mouthed glass-stoppered bottles.

An electrolytic lead refinery (Betts process) is being installed by Locke, Brackett & Co., of Newcastle-on-Tyne, England.

The Aërial Tramways at the Silver Cup Mine.*

BY GEORGE ATTWOOD.

In the plant for handling and treatment of ores, at the Silver Cup and Nettie L. mines, British Columbia, four aërial tramways have been constructed for conveying the minerals from the mines to the works; these are also used for conveying mining and food supplies, mining timbers and firewood, as well as passengers, to the mines. They are called tramways No. 1, 2, 3 and 4; they are shown in the illustration, Fig. 1, in plan.

They are of the double-rope type, consisting of two track cables, securely anchored at the upper (or loading) terminal, and sustained by supports at proper intervals; the necessary tension is maintained by means of suspended weights at the lower terminal. The buckets are suspended on travelers running on the track cables (see Fig. 2), being attached at regular intervals to an endless traction rope, which passes around a horizontal sheave at the discharge terminal, and is supported at a fixed distance from the track cables by sheaves on the supports. The speed of the tramway is controlled by a system of brakes on the grip-wheel at the loading terminal (see Fig. 3). The brake and loading levers are so arranged that any one of the tramways can be operated by one man, and no attention is required at the discharge terminal unless material has to be sent to the mine.

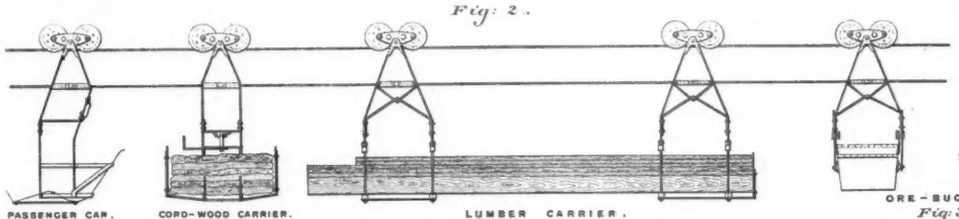
The country being heavily timbered, a space of 100 ft. in width was cleared for the tramway lines. The track cables for supporting the loaded buckets are 1 in. in diameter, made of the best crucible steel, in round strands, with a hemp core, and have a minimum breaking strength of 60,000 lb. The track cables for the unloaded side are ⅞ in. in diameter, of similar materials, and have a breaking strength of 50,00 lb. The traction or hauling cables are ⅝ in. in diameter, and have a breaking strength of 28,000 lb. The maximum working stress on the track cables is not more than one-sixth of the breaking stress.

The supports are equipped with cast-iron saddles for supporting the track cables, and with sheaves for supporting the traction ropes (see Fig. 4). The device for carrying the traction-rope sheaves is supported by adjustable rods, in order to maintain the correct distance between the track rope and the traction rope. The supports are constructed of framed timbers, the legs being given a wide spread and fastened into heavy timbers laid on good earth and rock foundations, prepared by cutting into the hill-sides. Where necessary, the legs are anchored. Tension stations for equalizing the strain on the track ropes are provided where required, the tension upon each section of the track cables being maintained by means of suspended weights, and the connection between the sections of the track cables being made by means of a rigid rail. The latter permits the buckets to pass without interruption from one section to another. The buckets are made of mild steel, and each has a capacity for 1,000 lb. of ore. They travel at the rate of 300 ft. per min. (or nearly 3½ miles an hour), and are attached to the traction rope by means of Riblet bucket clips (Fig. 5), which have proved serviceable and safe.

The buckets are loaded automatically, at the upper end, by means of automatic traveling hoppers operated by the passing buckets; these receive the ore from the bins in measured loads and deliver it into the buckets as they pass along. The loaders are built of steel plates and angle bars, and are carried on four wheels grooved to run on a suspended track (see Fig. 6). They are so arranged that they are gradually accelerated from a state of rest to the speed of the tramway, without shock to the moving parts; the operation is entirely automatic. All the buckets are returned from the lower terminals, mouth downward, unless filled with supplies, to prevent snow or rain collecting in them, and are automatically righted at the upper end. Telephones are supplied to each tramway for communication between the men in charge of the terminals, and there are also intermediate telephone boxes, so that the linemen can send messages in case of anything going wrong.

Tramway No. 1 was built in the autumn of 1902 to bring down the ore from the Silver Cup mine, and it has been running with few interruptions to the present time. Its total length is 7,887 ft., and the vertical fall between the upper and lower terminals is nearly 2,600 ft. Including the tension-station, situated near the middle of the line, there are 23 supports, the average height of which is about 35 ft., but some of them are more than 70 ft. in height. The ore-carrying capacity of the tramway is about 10 tons per hour; 20 buckets are in use. The capacity can be increased at any time by the addition of more buckets. Besides the ore buckets, two passenger-

Fig. 2.



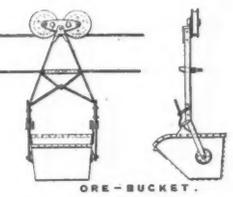
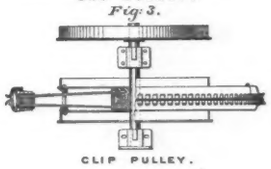
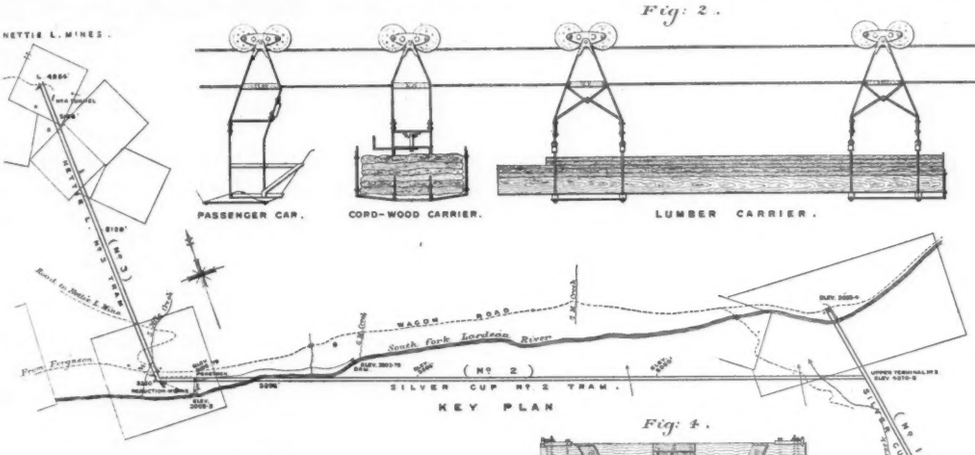


Fig. 3.





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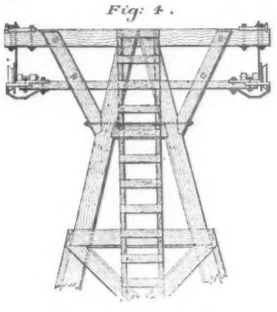


Fig. 5.

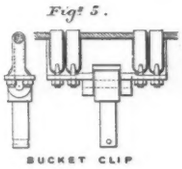
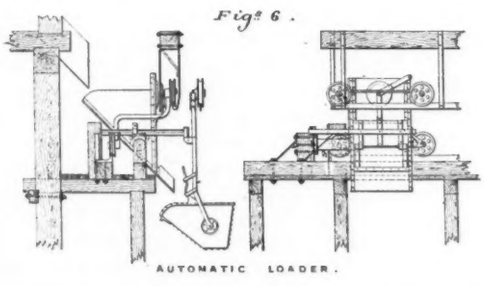


Fig. 6.



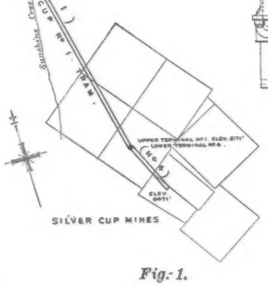


Fig. 1.

*Abstract of a paper in *Proceedings* of the Institution of Civil Engineers, Vol. CLIX, 1905.

carriers, six timber-carriers, and four cordwood carriers are used. Weights of more than 1,000 lb. have been taken up to the mine on the tramway.

The upper or loading terminal is situated just below the Sunshine Tunnel, which is the deepest working in the Silver Cup mines; it is provided with an 8-ft. automatic grip-wheel and removable grip-jaws. The grip-wheel is controlled by three hand-brakes operated by levers, so arranged as to afford easy and perfect control. The brake-drums are 5 ft. in diameter, two of them being of 6 in. and one of 4 in. face. At the lower terminal there is an 8-ft. sheave set in a tension carriage equipped with four flanged wheels and running on a track of tee-rails. The proper tension of the traction-rope is maintained by means of a convenient arrangement of weight-boxes attached to the tension-carriage. At one part of the line it was found advisable, owing to the prevalence of show-slides, to have a long span of 1,800 ft. In 1903, the snow-slides came down as usual, but no damage was done to the tramway. The snow in places is more than 20 ft. in depth and remains for about six or eight months in the year. The tramway has effected great economy, as the mountain-trail to the mine is fully five miles in length; the length of the tramway is only 1½ miles; the cost of carriage has been reduced from about $4.85 per ton to 48c. per ton.

Tramway No. 2 (Fig. 1) is 4¼ miles in length and has a fall of 1,120 ft. The upper terminal is situated on the line of Tramway No. 1 and about 1,800 ft. southeast of the lower terminal of that tramway. By adopting this site a saving of 720 ft. in fall was effected, and a better tramway-line was obtained on the south side of Lardeau creek. A large ore-bin has been erected, and as the loaded buckets on Tramway No. 1 come down from the mine their contents are emptied automatically into the bin, from which the ore is again charged by an automatic feeder into the buckets on tramway No. 2, and sent on to the reduction-works. On account of the contour of the country it was found necessary to put in two long spans; one, over the Lardeau creek, near the works, being 1,950 ft. in length and about 200 ft. above the ground at the highest point; and the other 2,020 ft. in length and about 295 ft. in height above Sunshine creek. There are altogether 40 supports to the line, including two tension-stations. The lower terminal has an 8-ft. automatic grip-wheel with removable grip-jaws. In order to assist the working of the tramway the grip-wheel is driven by bevel-gear from a 20-h.p. electric motor; the correct speed of the traction-rope is thus maintained. Besides timber and passenger carriers, 46 ore buckets are employed on this line, the capacity of which is 10 tons per hour and may be increased by the addition of more buckets. The upper terminal has an 8-ft. sheave set on a tension carriage, equipped with four flanged wheels and running on a track of tee-rails. The tension of the traction rope is maintained by means of a weight attached to the tension carriage.

Tramway No. 3 (see Fig. 1) was built for conveying the ores from the Nettie L. group of mines to the reduction works, and for taking up mining supplies. It is 7,712 ft. in length, and ascends 403 ft. in a distance of less than 1,000 ft. to the top of the hill, where it runs nearly level for some 2,800 ft., and then descends about 1,850 ft., at a sharp angle, to the mill. The tramway will convey the ore down by gravity alone, but in case any difficulty should arise in taking up freights it is intended to attach a small electric motor to the tramway grip-wheel to insure steady working. The tramway is carried on 25 supports, and 20 ore buckets are in use. The upper terminal is furnished with a 10-ft. grip-wheel and three hand-brakes, and an automatic loader. The lower terminal has a 10-ft. sheave set on a tension carriage; the general equipment is similar to that of tramways No. 1 and 2, except that the traction cable is ¾ in. in diameter, with a breaking strength of 36,000 lb. Tramway No. 3 has been working successfully for some months by gravity alone, and light loads are taken up to the mines without difficulty.

Tramway No. 4 (Fig. 1) is a short line, 1,300 ft. in length, extending from the upper workings of the Silver Cup mines down to the upper terminal of tramway No. 1, for which it is intended to serve as a feeder. The fall is 300 ft., the track cables are both ⅞ in. in diameter, the traction cable is ½ in. in diameter, and the tramway is carried on five supports. Eight buckets are employed, the tramway working by gravity, and the upper and lower terminals are similar to those used on the other three tramways.

In the new method of steel melting at the Sheffield, England, works of Edgar Allen & Co., Ltd., the blast of air is introduced at the side, and not at the bottom, of the converter. There are two rows of tuyeres, the bottom row acting upon the molten metal only, and the top row on the gas evolved. With a pressure of blast up to 4 lb., not only is intense heat generated, but the metal is less disturbed than in other converters. Each blow occupies 20 min., the castings ranging up to 12 tons each. The installation comprises three 3-ton and two 25-cwt. converters, with a capacity of over 300 tons per week. The process is to be installed at Woolwich Arsenal.

Arrastra grinding stones have been discovered at Zimbabwe, in South Africa, near old mine workings of great antiquity.

The *Electrical Review* (Sept. 30, 1905) states that electrically driven irrigating plants can be installed for about $4 per acre.

Cargo Sampling and Analysis of Iron Ore.*

BY W. J. RATTLE AND SON.

Before the installation of the "clamshell," the sampling of boats was not such a difficult proposition; at that time, boats were unloaded by shoveling the ore into buckets, the shovelers working down through the ore in the center of each hatch, to the floor, and then working out; this naturally gave good faces of ore to sample. With the slowness of unloading, the sampler found better walls of ore to sample and could take more time.

The present method of unloading varies, and consequently the method of procuring samples varies accordingly. For example, at the Erie docks, Cleveland, where they have three clam-shells, the boats are cleaned out until bottom is reached in all hatches; then the boat is shifted to the Brown bucket machines, and unloading is finished by hand. In this case, we aim to sample the ore when the boat has left the clams.

Sampling at Lake Erie Ports.—By the term "Lake Erie Ports" we mean all the docks from Detroit, Mich., to Tonawanda, N. Y. Our method of sampling is the same at all docks along the frontage defined above. The necessary tools used in sampling are a large-sized trowel, a hammer, and a wide-mouthed can with a capacity of 45 lb. With these the sampler enters the boat when bottom is reached, sampling every hatch in the following manner: Starting from one side, he goes around the walls from bottom to top, taking one-half a trowelful of ore from every 18 in., the distance between his perpendicular sampling being 24 in. When lump ore is encountered, he takes a piece in bulk equal to the amount of fine ore taken on each trowel sample.

When he has filled his can, he dumps this upon a clean floor space in the boat, and proceeds until each hatch has been sampled. After completing this, he goes over his sample carefully, cracking up the lumps so that the entire sample can be homogeneously mixed together.

Our method of mixing the sample on the boat is by shoveling the ore from one pile to another, putting each shovelful on top of the cone until all the ore has been delivered from one pile to the other. After repeating this several times, the pile is flattened out by placing one corner of the cutting edge of the shovel in the top of the cone and circling the pile. This distributes the ore evenly and at the same time flattens the cone. The flattened pile is evenly quartered, and opposite quarters are thrown out. The above mixing process is continued, and if found necessary, the lump ore is crushed finer (this is done when 35% or over of the cargo is lump ore); the last quartering (about 100 lb.) is saved and put into cans.

*Abstract of a paper presented at the Lake Superor Mining Institute, Menominee Range, Oct., 1905.

The amount of ore taken for each sample before mixing and quartering, depends upon the tonnage sampled; this varies, but, as a rule, 45 lb. to 55 lb. is taken from each hatch. The last two opposite quarters are taken to our crushing-and-drying house on the docks, weighed, and dried at 212°; it is again weighed when dry and the difference is the cargo moisture.

The sample is then crushed in a Gates crusher, thoroughly mixed as described above; 10 to 15 lb. is sent by express to our laboratory for analysis, the sampler keeping in reserve one-half of the last quartering for emergency.

The advantage of having these drying-and-crushing plants on the docks is that a larger sample can be mixed in the dried-and-crushed state, better than the wet ore as it comes from the boat. Also determining the moisture at the docks avoids all accidents that might happen to an undried sample in shipment, and gives the proper percentage of moisture in each cargo on its arrival at the unloading dock.

In summing up the question of sampling all grades of iron ores that are delivered at "Lower Lake" ports, it is difficult to state all variations that occur. As a general rule, no two boats are unloaded under exactly the same conditions, and no two cargoes of the same ore present the same surfaces; therefore it is impossible to instruct the samplers along any general rule other than that given above.

We believe firmly in large samples, 300 to 1,500 lb. Of course, the amount depends upon the tonnage sampled, but roughly ¼ lb. per ton; this gives a sample that is representative.

Before the docks installed the present fast unloading machines, we used to take three rounds for each sample (sampling the ore in the boats when one-quarter unloaded, again when one-half out, and a third time when three-fourths out), mixing all three samples together for our final sample; but now the time allotted to unloading is so short that three rounds are entirely out of the question. We have proven that one large sample, taken when the boat is about one-half out, gives the proper composition of the ore.

Laboratory Analysis.—The samples, having been dried at the docks, are run through a crusher until the ore will pass a 15-mesh sieve. After crushing, the sample is mixed on oil-cloth by rolling, and also by pouring the ore from one pile to another; opposite quarters being taken and mixed as above, until about 5 oz. is left. This is placed on a chrome-steel plate and bucked down until all the sample passes a 100-mesh sieve; it is then thoroughly mixed by rolling. About 1 oz. of this ore is dried in a water bath at 212° F., placed in a bottle, corked tightly, and allowed to cool. From this dried sample, all determinations are made.

Iron.—Weigh ½ gram of ore into a No. 0 beaker; dissolve in hydrochloric acid, with the addition of a small amount of stannous chloride; reduce with stannous chloride while hot; transfer to a No. 4 beaker; add 10 to 15 c.c. mercuric chloride, and dilute to 400 c.c.; add 10 to 15 c.c. manganese sulphate mixture, and titrate with permanganate. Mercuric chloride is in a saturated solution; manganese sulphate mixture is made as follows: Dissolve 800 grams in 5,550 c.c. water; add 1,650 c.c. phosphoric acid and 1,600 sulphuric acid. Permanganate is made to have 1 c.c. equal 1%, using ½ gram of ore.

Phosphorus.—Dissolve 4 grams of ore in hydrochloric acid; evaporate to 5 or 10 c.c.; add 40 c.c. nitric acid concentrated; evaporate to about 15 c.c., dilute and filter; add ammonia until it sets to a stiff jelly; then add a few c.c. in excess. Re-dissolve with nitric acid, heat to 85° C., and precipitate with molybdate solution, made as follows: Dissolve 400 g. molybdic acid in 1,600 c.c. ammonia (.96 sp. gr.), and add this to 6,000 c.c. nitric acid (1.20 sp. gr.). Add 40 c.c. of this solution and shake five minutes; settle; filter, wash with a solution of ammonium sulphate (25 g. of the crystals, 50 c.c. sulphuric acid, 2,500 c.c. water). Dissolve, precipitate in flask with ammonia (1 part ammonia, 3 of water); wash filter twice with water; add 10 g. "mossy zinc," and 80 c.c. sulphuric acid (1 part acid, 3 parts water); heat 15 min.; filter through cotton, wash with water and titrate with permanganate, using the same solution as that used for iron determination (1 c.c. equals 1% iron on ½ gram of ore). Multiply number of c.c. used by 0.2035; the result is phosphorus.

In ores which retain some of the phosphorus in the residue, this is ignited over the blast for about five minutes in a crucible; then transferred to a beaker and boiled with 10 c.c. nitric acid (1.20 sp. gr.) for five minutes and filtered into the main solution.

Silica.—Weigh out 1 g. of ore; dissolve in hydrochloric acid, add a few drops of nitric acid and evaporate to dryness; take up in hydrochloric acid and filter. Burn off the filter in a platinum crucible, and fuse with carbonate of soda. Dissolve in weak hydrochloric, and evaporate to dryness. Moisten with hydrochloric acid; add hot water; filter, wash with hot water and weak hydrochloric acid; ignite in crucible and weigh in silica.

Manganese.—Dissolve ½ to 2 g. of ore in hydrochloric acid; add 5 to 10 c.c. sulphuric acid and evaporate until fuming freely; cool, dissolve in water, transfer to ½-liter flask; precipitate iron with zinc oxide suspended in water, dilute to mark and filter; measure off 2 portions of 200 c.c. each and titrate each portion. Multiply number of c.c. used by 0.1473 and divide by the number of g. represented in solution. The result is manganese.

Alumina.—Dissolve 1 g. ore in hydrochloric acid; evaporate to dryness, take up in hydrochloric acid, filter and fuse residue; dissolve the fusion in weak hydrochloric acid, evaporate to dryness; moisten with hydrochloric, dissolve in hot water, filter into first filtrate, neutralize with ammonia, add 3 and 3-10 c.c. hydrochloric acid; dilute to 450 c.c.; add two g. sodium phosphate in solution and stir until solution is clear; add 10 g. hyposulphite of soda, and 15 c.c. acetic acid (30%); let stand 15 min., boil 15 min., filter, wash with hot water, dry, ignite and weigh as aluminum phosphate.

Lime and Magnesia.—Dissolve 1 gram of ore in hydrochloric acid and evaporate to dryness; redissolve in hydrochloric acid, dilute, filter and fuse residue with sodium carbonate; dissolve in weak hydrochloric acid, evaporate to dryness; cool, moisten with hydrochloric acid, dissolve with water, filter and wash into the first filtrate; heat to boiling, precipitate iron with ammonia, filtering while hot; wash several times with hot water, add a few c.c. of ammonia to filtrate and heat to boiling; add 10 c.c. hot ammonium oxalate, boil five minutes, let settle, filter and wash with hot water. After thoroughly washing beaker and precipitate, transfer precipitate to the beaker in which precipitation was made; wash the filter with weak sulphuric acid; then add 15 c.c. concentrated sulphuric acid, heat to 70° C. and titrate with the permanganate used for iron determination (1 c.c. equals 0.005 g. iron). Multiply the result by 0.2500; the result is calcium oxide.

Magnesia.—Cool the filtrate from lime; add 10 c.c. concentrated solution of sodium phosphate and ammonia (equal to about 1-10 the bulk of solution); stir well; let stand in a cool place over night; filter, wash with 10% ammonia, ignite in porcelain crucible and weigh. Multiply the weight by 0.36036; the result is magnesia.

Sulphur.—Dissolve 3 g. of ore in aqua regia; evaporate to dryness, take up in hydrochloric acid, and evaporate a second time; take up in hydrochloric acid again and filter. Precipitate with barium chloride while hot; let settle and filter; wash with cold water and weak hydrochloric acid; ignite and weigh as barium sulphate. It is always best to test acids; if sulphur is found, determine amount and deduct from results.

Loss by Ignition.—Weigh 1 g. of ore in platinum crucible; heat over blast lamp about five minutes; cool and weigh; the difference is organic and volatile matter.

Various indications of possible potassium deposits have been found in saline springs, in oil wells and bore holes, and in desert deposits. In his forthcoming report, Mr. Courtis presents a table which shows the potassium, sodium, and magnesium salts in saline springs of the United States; also analyses of salts from various California and Nevada localities. The report closes with a bibliography of potassium salts.

The "Deepwater-Tidewater" Railroads.

BY GEO. W. HARRIS.

West Virginia is enjoying much railroad development, especially in the region lying between the Chesapeake & Ohio and the Norfolk & Western railroads. The "Deepwater-Tidewater Railroad" in this district has been contemplated for about two years; now the announcement is made that the whole line is to be placed under contract at once. The contracts specify that the time shall not exceed two years.

The system is to extend from the head of navigation on the Kanawha river to tidewater at Hampton Roads. In other words, starting at Deepwater on the Chesapeake & Ohio Railroad, in West Virginia, the road will reach Sewells Point, eight miles below Norfolk, in Virginia. In West Virginia it is chartered as the Deepwater; and in Virginia as the Tidewater Railway. It is expected that this line will ultimately be extended to the Great Lakes on the north, thus involving a system 1,000 miles in length, with eastern and western connections.

The significance of this railroad may be seen from the accompanying map. The new road will have the Kanawha field on the one side and the New river on the other. Continuing south, the famous New river and Pocahontas fields will be traversed; the railroad will emerge from the coal regions at the eastern portion of the Norfolk & Western territory. The Deepwater-Tidewater and its branches will open for development about 3,000 square miles of virgin coal lands, embracing all the rich seams tributary to railroads mentioned.

The Kanawha and New River-Pocahontas smokeless coals of West Virginia are unsurpassed; they are abundant, and are mined at minimum expense. But obstacles to successful exploiting of some parts of this territory have been found in insufficient transportation.

Of course this new system plans for cheap transportation; consequently, the route from Sewells Point to Deepwater was selected with reference to such favorable grades as are consistent with shortness of distance. The road, from the main yards at Princeton, in Mercer county, to tidewater, will have no grade greater than 25 ft. to the mile; 8 miles of 25-ft. grade will be necessary to cross the Alleghenies. The main part of the line will have nothing greater than a 7½-ft. grade, or 0.2% compensated for curvature, practically a level road. The total lift of the Deepwater-Tidewater is only about 1,000 ft., while on the Norfolk & Western it is 4,000 ft., the larger portion of which has grades of 50 ft. and over to the mile.

The coalfields covered by the Deepwater-Tidewater lateral branches will be extensive and valuable. Thus the Deepwater-Tidewater traverses the headwaters of the many streams which offer opportunities for laterals. In connection with these laterals, may be noted the large territory that will be opened by a branch down the Guyandotte river. This latter section already has important coal properties in various stages of development.

The tidewater terminal of this new system has certain advantages. The railroad owns 520 acres of ground at Sewells Point, with a deep-water frontage of 3,300 ft. The land selected for a terminal is opposite the holding ground of Hampton Roads for all vessels; the channel is unobstructed, and there is open water to the piers at low tide.

On the 460 miles from Deepwater to Sewells Point, considerable progress has been made in grading and track-laying at both ends of the line. On that part of the road from the Chesapeake & Ohio to the Norfolk & Western connection, 35% of this 105 miles is graded. In the aggregate, some 40 miles of track has been laid, and about 34 miles is in operation. It is expected that during the next 12 months approximately $13,000,000 will be paid out on construction account.

The road is substantially constructed; 85-lb. rail is used, and the track is ballasted with crushed stone. Tunnels are cut 22 ft. above the rail, 5 ft. greater than is customary in that part of the State. While not conceived mainly as a passenger road, nevertheless the Deepwater Railway will furnish quick communication between the New River and the Pocahontas coalfields. The new line will save over 200 miles and several transfers between these points.

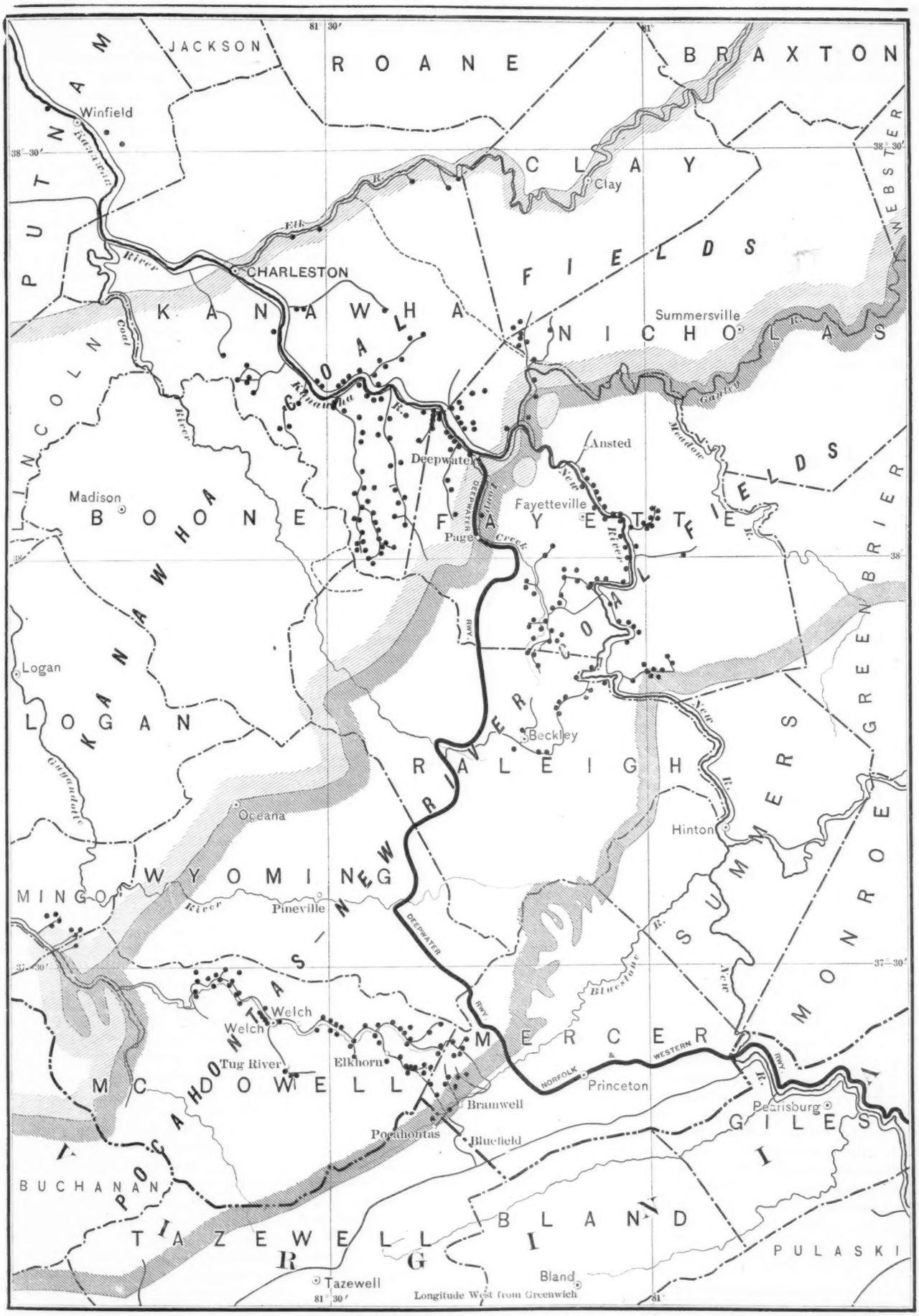
Contracts for rolling stock were made several months ago, and locomotives, coal and freight cars are arriving. This equipment is employed in delivering material used in the construction of the line, and also for transporting coal and coke from the Loup Creek colliery property, at Page, West Virginia. This new plant is the largest coke operation in the State, and is on the Deepwater-Tidewater railroad, 8 miles from Deepwater. Capitalists interested in this model plant are also supposed to be identified with the new road

One of the most unique features of this line is the method of financing the undertaking. The aggregate capitalization of the Deepwater-Tidewater railway amounts to only $175,000, and yet construction is contracted involving an outlay of millions. The road is being built, and paid for, without asking anyone to buy a bond. No county is requested to subscribe for stock. On the other hand, an expensive right-of-way has been bought. It is evident that the railroad is being built by powerful interests. Various suggestions as to the identity of these parties have found expression in the press, but none are certainly authoritative. However, it is of interest to note the officers of the system. Of the Deepwater Railway, J. O. Green, of New York, is president; G. W. Imboden is vice-president, and R. C. Taylor, secretary, both of Ansted, West Virginia. The Tidewater Railway has the following officers: W. N. Page, president; T. D. Ranson, vice-president; and H. J. Taylor, secretary, of Staunton, Va. For both roads, the treasurer is G. H. Church, of New York; H. Fernstrom is chief engineer; the general manager is Raymond Du Puy.

The construction of the Deepwater-Tidewater Railroad, and of the Loup Creek Colliery Company, may, in part, be traced to the success of the Gauley Mountain Coal Company, at Ansted, West Virginia. A number of years ago certain New York capitalists (among whom were Abram S. Hewitt and members of the banking house of Morton, Bliss & Co., together with W. N. Page, of Ansted, West Virginia) acquired control of the property now operated by the Gauley Mountain Coal Company. Later these same interests, with others, bought 25,500 acres on Loup creek The development of this extensive tract was started at Page within a few years. There is a persistent rumor that Henry H. Rogers is one of the principal figures connected with this new enterprise. The grounds for such a statement might be found in the connection of Mr. Rogers with the Loup Creek Colliery Company, and the association of W. N. Page as his consulting engineer.

From the first, some antagonism developed against this new coal carrier on the part of the neighboring railroads. The great coal roads of the Appalachian fields, the Baltimore & Ohio, the Chesapeake & Ohio and the Norfolk & Western, all have Pennsylvania representatives on their respective directorates. The Deepwater-Tidewater has had to contest every foot of advance, notwithstanding that the policy of the new road is stated not to be the diverting of present tonnage.

For driving roll trains, L. Creplet, engineer of the Société International d'Electricité, Liège, advocates the use of continuous-current motors. There are already several applications in Belgium. The Grievegnée Company uses a merchant mill driven by a compound-wound motor that can develop from 450 to 900 h.p.; the Providence Company has another capable of 500 to 1,000 h.p. The Ougrée-Marihaye Company (which has already applied this improvement) in a few months will have in use a roll-train motor of 1,000 to 1,500 h.p., capable of direct driving at 75 to 135 r. p. m. M. Greiner, general manager of the Cockerill Works, Belgium, states that the problem of driving roll trains electrically is already solved from an economical point of view; he expresses the opinion that the best solution is central electric generators driven by gas-engines, and each roll train driven by its own motor.



MAP SHOWING WESTERN END OF DEEPWATER-TIDEWATER LINE.

Mica.

BY PHILLIPS THOMPSON.

The substance of this sketch is taken from a monograph on mica[1] by Fritz Cirkel, noticed elsewhere in this JOURNAL.

This work comprises the results of an exhaustive investigation made by the author (in accordance with the instructions of Dr. Eugene Haanel, Dominion Superintendent of Mines) of the productive mica fields of Canada. It was prepared with special attention to the commercial phase of the subject; it gives information in regard to the geological features of the mica areas, the mode of occurrence in the working mines, and an account of the present outlook of the Canadian industry. The various and increasing uses of mica are dealt with, and some details are presented as to the foreign production of mica, more especially of India. The report is illustrated with cuts and also contains a map of the mica region of Ontario.

Of the many species of mica only three are of commercial importance, viz., muscovite (the "white mica" of the trade); phlogopite (a magnesia-alumina mica of amber or dark-brown color, which furnishes most of the "amber mica" of commerce); and biotite or magnesia—iron mica, generally black.

Muscovite.—The exploitation of muscovite, the commonest of the micas, has been attended with difficulty in Canada, owing to the great dispersion of the deposits; to their sporadic, and sometimes erratic, occurrence; and to the lack of adequate transportation. The occurrence of this mica is mainly confined to pegmatite dikes, masses, lenses, sheets or veins, which may be regarded as a coarse granite consisting of feldspar and quartz in variable quantities. These dikes occur in the Laurentian, and in many cases have been involved in the structural modifications of the existing rocks. They penetrate the gneiss formation along, and sometimes across, its strike, but usually conform with the strike of the country rock. As a rule, crystals of muscovite of economic value are not found in dikes of less than three or four feet in width, though exceptional instances are noted where crystals measuring from 4 to 6 in. across the basal planes have been found in small dikes. On the other hand, some of the largest dikes contain no mica of commercial size. In the absence of any leading indications it is difficult to say which dike is likely to contain muscovite in paying quantity. The mica crystals are generally scattered promiscuously through the matrix, while larger, vein-like aggregations are observed near the contact with the adjacent formation. Cavities lined with crystals are also found along the contact; the mica obtained from there is generally of superior quality. All gradations in size are obtained; sheets of 18 and 24 in. across have been found in the Villeneuve mine, Ottawa Co., Que.

Pegmatite veins or dikes occur throughout Canada in a large number of places where there are Laurentian exposures; but the extensive areas of this formation are concealed by sedimentary strata. The best desposits of muscovite so far discovered are those of the Saguenay district, below Quebec; there are also deposits near Mattawa, to the north of Ottawa, and at several places in Ontario. At the McGee mine (Bergeronnes township, east of the Saguenay river), there is a vein running for a quarter of a mile, the width of which is from 15 to 25 ft. in the southern part where it has been worked for 140 ft. On the northern part it measures over 75 ft., and is rich in crystals. It has been worked intermittently; and, at the time of Mr. Cirkel's examination, operations were suspended. Another property in this neighborhood, the Hall mines, at the head of the Little Bergeronnes river, has a vein yielding white transparent mica of exceptional value, which is 100 ft. in width, increasing sometimes to 200 and even 300 feet.

The Villeneuve mine, in Ottawa county, Quebec, once the most prominent white-mica mine, was first worked in 1884, and in four years produced about 35,000 lb. of cut marketable sheets of good quality. It is noted for the minerals containing the rare earths and found throughout the pegmatite. These include uranite, monazite, cerite, cleveite and pitchblende. Tourmaline, beryl and garnet are accessory minerals. The mica often occurs in large masses, one crystal weighing 281 lb. and yielding $500 worth of mica.

In Berthier county the Maissonneuve mine yields crystals furnishing sheets cutting from 2 by 3 in. up to 3 by 7 in.; it is also distinguished by the occurrence of foreign minerals, including tourmaline, beryl, garnet and the rarer mineral samarskite.

A property near Lake Pieds des Monts (Charlevoix county, Quebec), where a crystal of 700 lb. was found, has come into prominence on account of the mineral cleveite, which contains radium.

In the province of Ontario several promising deposits of muscovite have been discovered, but none of them has been worked to any great extent. In British Columbia, mica deposits, in the vicinity of Tête Jaune Cache (about 150 miles northwest of Donald, on the Canadian Pacific railroad), have been exploited, sometimes yielding crystals cutting sheets of 18 by 11 in. The output is transparent muscovite, with a light greenish tint. Dikes containing large mica crystals have been found throughout the Archæan rocks of Ungava territory, but they are seldom of commercial value.

Phlogopite.—The occurrence of workable phlogopite deposits appears to be confined solely to Canada, and more especially to an area in Quebec province, north of Ottawa, and to a more limited field in eastern Ontario. Apart from some outlying occurrences, the mica-producing country north of Ottawa covers a triangular area of about 400 sq. miles, with the southwestern corner north of the city of Hull, the northwestern in the township of Derry and the northern angle in the northern part of Hincks township. In Ontario there are two separate mica districts: one of about 70 sq. miles in the townships of Loughborough and Bedford; the other of about 50 sq. miles in North Burgess, with the town of Perth as its center. The available phlogopite deposits are confined to the Laurentian formations; the rocks in which it is found are distinctly stratified and dip at all angles. The southern extremity of this formation is in Loughborough township, in the country around the village of Sydenham (which is the center of the mica industry of southern Ontario). The formation extends in a northerly direction through Bedford, Crosby and South Sherbrooke townships, forming another extensive mica district south of the town of Perth. Between this area and Ottawa the Laurentian is overlaid by Cambro-Silurian rocks, and hence this section is not mica-bearing. The Laurentian outcrops again in Ottawa county, Quebec, north of the Ottawa river; it furnishes the mica belt in the region tributary to the Lievre and Gatineau rivers.

The phlogopite deposits are associated with pyroxene rock, which penetrates the gneiss or limestone in the form of dikes. These sometimes occur along the banding of the country rock, and extend in lenticular masses along the planes of stratification. Generally two classes of deposits can be distinguished: "contact deposits," forming the contact between gneiss and the pyroxene rocks; and "pocket deposits," occurring in fissures wholly in pyroxenite or on the contact between intrusive feldspar rock or diorite and pyroxenite. Apatite is frequently encountered in small masses in the vicinity of mica deposits.

The vein-like, or contact deposits, are the most important from a mining point of view. As a rule, the mica occurs in lenticular bodies connected with each other along the wall of the gneiss, or along certain lines of fracture in vertical as well as horizontal extension. The advantage in mining vein-like, or contact, deposits, lies in the fact that the amount of dead rock to be removed is reduced to a minimum, and development work can be more systematic. Though some good mines have been profitably worked (in which the mica was found in pockets near small dikes of diorite and feldspar rock, or wholly in pyroxenite, the mines at the cascades on the Gatineau river being instances in point), this mode of occurrence is accompanied by greater uncertainty as to permanency and entails more risk in working.

[1] *Mica, Its Occurrence, Exploitation and Uses.* By Fritz Cirkel, Published by the Mines Branch, Department of the Interior, Ottawa, Canada.

Exploitation and Preparation.—In the chapter devoted to this phase of the subject, the writer considers the question of what is the lowest percentage of commercially valuable sheets of mica in the rock on which a mine can be made to pay. Arguing, from the experience of the Quebec mines, he comes to the conclusion that, in the case of quarry work, about three tons of run-of-mine, yielding 750 lb. (and in the case of underground work, about five tons of run-of-mine, yielding 1,250 lb.) of "thumb-trimmed" mica should be extracted for every 100 tons of rock to make a mine, working under ordinary conditions, pay expenses and leave a profit.

The rise of the industry to an important place among the mineral activities of Canada has been quite recent. In its earlier days, mining was carried on in a spasmodic manner. Many small producers worked intermittently, taking out mica which happened to outcrop on their farms, and stopping work with a falling market or when deposits appeared to be exhausted. A more practical system has now been adopted, and development work is now pursued in depth. Powerful companies, owning considerable areas of mineral lands, have started work on a large scale. The machinery now installed by the large operators is erected with a view to deep sinking and extensive operation. Formerly, when deep-shaft mining was attempted, all the mica within reach was mined without giving a thought to reserves; but within the last few years several mines, especially in Ontario, realizing the importance of an ore reserve (in case of a sudden or exceptionally large demand), have carried on operations with this object in view, and have considerable reserves ready to be stoped at any time.

"As to the future possibilities of the productive mica fields of Canada," says the author, "there is no doubt that the future outlook for the production of a large tonnage is very bright; and, if Canada should ever be called upon to furnish the world's supply, the mica fields of Ontario and Quebec could soon be prepared for such an emergency."

At present the mica industry of Canada employs 550 persons, but this is only about half the usual number, owing to the temporary slackness of the demand, probably caused by last year's over-production. The wages paid last year approximately amounted to a total of $120,000; the aggregate outlay for plant, buildings and all accessories is estimated at about $160,000. The value of the output of 1903 was $176,334, as compared with $75,719 in 1893, and $29,008 in 1886. The total value of the mica produced in Canada up to the beginning of 1904 is figured approximately at $2,000,000. The principal market is the United States, though of late years Britain has taken a large share of the production.

Electrometallurgy of Antimony.*

BY ANSON G. BETTS.†

The treatment of antimony ores, antimony sulphide and impure metallic antimony, by fusion processes is difficult and expensive, and the results not generally very good. There are different makes of antimony on the market, with considerable differences in prices. Commercial antimony often contains important quantities of gold. A chance sample which I assayed contained 1.75 oz. of gold per ton. Antimony ore often contains gold, so that the question of the purification of crude antimony should have some interest.

It has been proposed to use chloride solutions for the recovery of antimony from ores and from impure antimony, and to use alkaline sulphide solutions for the extraction of antimony from ores. (Processes of Kopp, Sanderson and Borchers, Siemens and Halske.)

Acid ferric chloride solution is said to attack stibnite with ease, producing a solution of ferrous and antimonous chlorides and a residue of sulphur; and from this solution metallic antimony and ferrous chloride should be recovered by electrolysis. I have applied the same idea to the treatment of crude antimony, and find that the electrolytic operation can be quite easily carried out.

Carbon anodes and copper or lead cathodes may be used. The ferric chloride generated at the anode is heavier than the main solution, and continually runs down the anode surface and collects at the bottom of the cell, whence it may be drawn off, while fresh ferrous chloride-antimonous chloride is added at the top.

Antimony trifluoride is much superior to antimony trichloride for electrochemical purposes. When a solution of it is electrolyzed with insoluble lead anodes, the main action at the anode is the liberation of oxygen as gas, and the formation of hydrofluoric acid in the solution, being thus similar to the behavior of a solution of copper sulphate when electrolyzed with a lead anode. When iron is present a good deal of ferric salt is formed, particularly with low anode current densities.

Antimony oxide is obtained in some metallurgical operations, such as the roasting of antimony sulphide, and this may be dissolved in hydrofluoric acid and electrodeposited from the solution with lead cathodes and lead anodes as a beautiful solid deposit, and, if the solution is free from copper and antimony, of high purity.

Copper is the most troublesome metal in the electrometallurgy of antimony. In the chloride solution it stands very close to antimony in the electromotive force series, but in the fluoride solution it stands below antimony, and may be precipitated from solution by antimony.

When the fluoride solution was first tried for the electrolytic refining of antimony, alkaline sulphates and sulphuric acid were added to improve the conductivity, and in the hope of making the use of lead linings even more successful. Beautiful deposits were obtained, but if the anode contains even very small amounts of impurity, the polarization rapidly increases, in some cases almost stopping the current entirely, and always causing the solution of impurities of the anode, such as copper, so that no purification is effected from copper.

In such a solution the current would be mainly carried by the sulphuric acid, and the anions liberated would be almost entirely sulphion, so that antimony sulphate would be primarily formed. Antimony sulphate would immediately decompose into basic sulphate, which would then have to be dissolved by the hydrofluoric acid present. If the anode contains lead, for example, there would be enough lead sulphate present to seriously interfere with the action of the hydrofluoric acid. It is therefore concluded that the cause of the trouble is the presence of sulphion, and experiment shows this to be a fact.

With the omission of sulphion there is no difficulty at all. The anodes dissolve as readily as copper or lead anodes, and the cathode deposit of antimony leaves nothing to be desired. No analyses have as yet yet been made of the antimony, but there is no reason to think that it is not very pure.

*Abstract of a paper read at the eighth general meeting of the American Electrochemical Society, at Bethlehem, Pa., September 18, 19 and 20, 1905.

†Metallurgical chemist, Troy, N. Y.

Tin Mining in Indo-China.

Tin has been obtained in the Chinese Province of Yunnan for many years, most of it never reaching the outside world. More recently, alluvial deposits have been opened in the vicinity of Cao-Bang, in the north of Tonkin and just south of the Chinese boundary. They lie in a high valley on Pia-Ouac mountain, where a granulite encloses veins carrying cassiterite and wolframite. The Tinh-Tuc grant is the most actively developed; here the alluvium, upon washing, is said to yield 5 kg. of cassiterite per cubic meter, the concentrate averaging about 50% tin. Sluice boxes of the Malacca type are used, with which the loss of fine ore is extreme. At a few workings the ore is reduced in crude furnaces using wood as fuel, with primitive blowing devices, in spite of which the yield reaches 80% of the assay contents of the ore. The product is of good grade, owing to the absence of wolframite and mispickel in the concentrate; it is run into 25-kg. pigs, which are sold to traders at 60 to 70c. per kilogram. About 1 kg. per day is the average of the coolie laborers.

Metallic titanium, a metal which formerly was little studied, produces one of the strongest alloys of copper known. Its tensile strength is said to be greater than that of aluminum bronze.

Recent Improvements in Core Drilling Without Diamonds.

BY LUCIUS I. WIGHTMAN.

The Davis system of "core drilling without diamonds" is perhaps so well known as to justify only a brief description of the general method. The feature which primarily distinguishes the Davis drill from all other core drills is the absence of diamonds. Instead of that very expensive abrasive, the rock is cut by means of a special cutter which merits brief attention at this point. This is a cylindrical shell of selected steel with a series of chisel edges, milled or forged in of the stone mason, which, it is well known, will dress very hard rock.

The drill rods are hollow, and a stream of water is constantly forced downward to the bits. This stream catches the cuttings and carries them at high velocity up the bore to the top of the "calyx," where the opening is increased, the velocity consequently reduced, and the cuttings settle into the space between the calyx and the drill rods, where they accumulate in a second, but reversed, record. This calyx is another distinctive feature of the Davis drill. It is a tube of the same diameter as the core barrel, resting on the reducing plug at the bottom and open at the top, cal rate. In such cases the chilled-shot method is used.

Chilled shot—which is simply molten iron or steel "atomized" and suddenly cooled—will scratch glass. The Davis shot bit is of a special metal, and simply rotates in the hole. Chilled shot is between bit and rock, and under the rotation and pressure of the drill rods, the rock surface is milled or crushed away. There is no rock hard enough to resist this action—no rock too hard to be bored at a payable rate by this process. The shot is cheap; its consumption varies from 10 to 50 lb. per 100 ft. bored, according to the material.

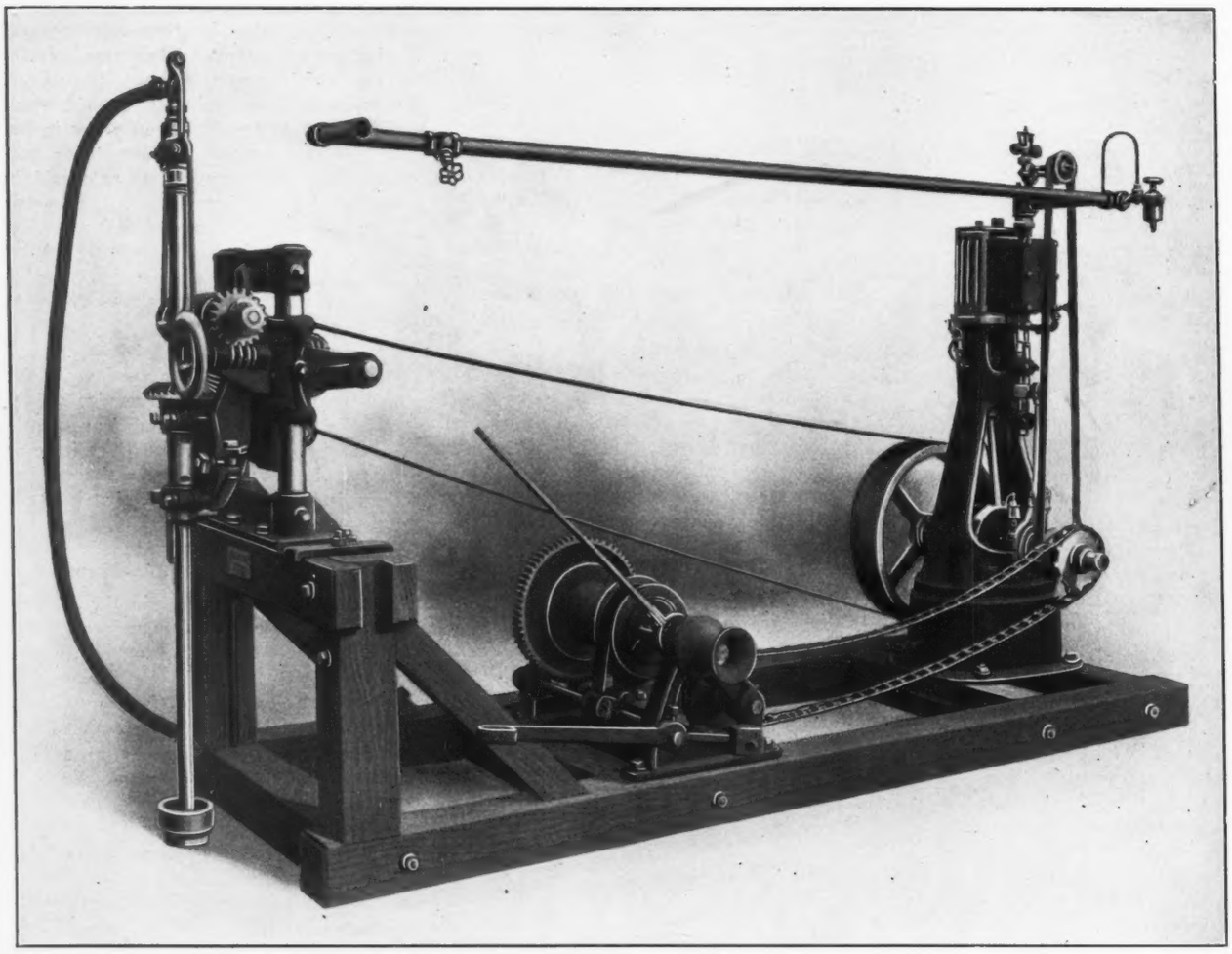


FIG. 1. SURFACE OUTFIT FOR CORE DRILLING.

one end. The other end is threaded for attaching to the core barrel. In operation the cutter and barrel are rotated by the drill rods and at the same time forced downward. The bits engage the rock; the drill rods rotate until the twisting effort becomes sufficient to overcome the bite of the cutter in the rock, when the bits break off fragments of rock and the cutter springs to another position, when the operation is repeated. The accumulated torsional effort in the twisted drill rods gives a tremendous force to the blow. The process is almost identical in effect with the hammer and chisel action as above indicated. Its special value is in retaining the cuttings in a second record. It has an even greater importance in always keeping the bore clean and free from cuttings, thus preventing "stuck" drills and saving the trouble and expense of pumping the sludge to the surface. The core rides inside the cutter and is broken off at convenient lengths.

The Davis cutter will rapidly and economically cut the majority of rocks. In sandstone and hard shales rates of 0.75 in. per revolution are not uncommon. But there are some rocks so hard that this cutter will not bore them at an economi-

The accompanying illustration, Fig. 1, shows a complete surface outfit with engine, hoist and drill mounted on a solid wood frame. The drill is belted, in the belief that it is better to have a belt slip than a drill rod break. The hoist, on the contrary, is chain-driven and positive. All controlling valves and levers are within easy reach of the operator. In operation, a tripod of timber is erected above the drill for handling the heavy drill rods, barrel, etc.

Many improvements have been added to these drills, among which is a double core-barrel, designed especially for securing cores from soft coal.

The prospecting of soft-coal lands by core drilling has always been a difficult operation; the softer the coal the greater the difficulty. The jar and vibration of the ordinary core drills shattered the core, and the constant grinding of the tube on the core reduced the coal to a powder and destroyed any reliable record. The Davis company has been doing some contract drilling in West Virginia coalfields to prove the usefulness of the drill for the coal of that region. With the aid of the new device, 95 to 100% of perfect cores have been secured, demonstrating beyond question the success of the improved system in soft coal.

The accompanying illustrations, Fig. 2 with index letters, clearly shows the construction of the new double core-barrel arrangement. Referring to the figure, *L*-42 is the shot bit attached to the lower end of the outer core-barrel, *L*-65. This, in turn, is joined by threads at *L*-2 to the ball-bearing core-barrel plug, into the upper end of which the drill-rods screw at *T*-84. Hung inside of the outer core-barrel *L*-65 is the inner core-barrel, *L*-69, which is journaled and supported at the top by the double-ball thrust-bearing. Just

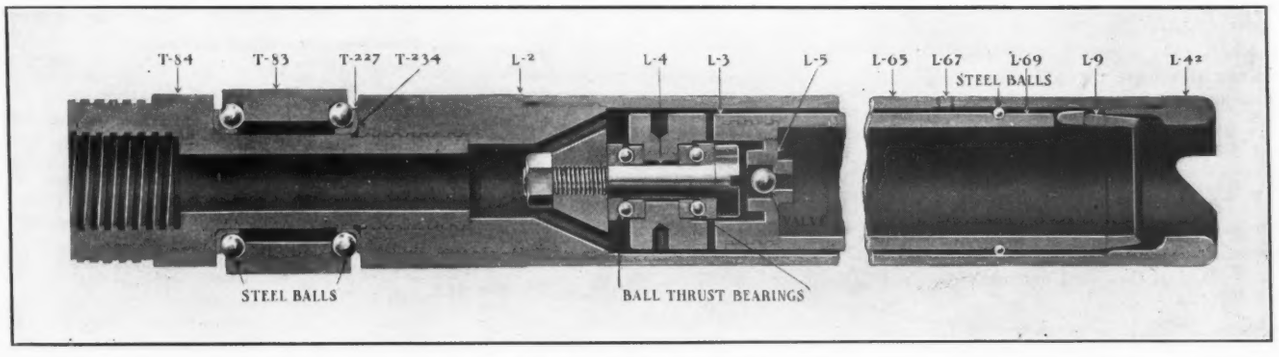


FIG. 2. SECTION OF DRILL.

below this bearing is a ball valve *L*-5, which lets out the air as the drill is lowered into the bore-hole. It then closes automatically, shutting out the water pumped down the drill rods from the surface, which is thus compelled to pass downward through the annular space between the outer and inner core barrels. A row of steel balls near the lower end of the inner core-barrel reduces friction and keeps the barrels concentric. The core breaker *L*-9 is attached to the lower end of the inner core-barrel.

The operation of the double core-barrel device is as follows: The outer core-barrel rotates, carrying the cutting bit which cuts the core; as the core rises, the inner core-barrel remains stationary, due to the friction between the core on the one hand and the barrel and breaker on the other. This inner barrel acts as a protecting sleeve around the core, which (as broken) is simply forced upward, and is not turned around and ground into fragments. Herein is the key to the success of the new system of soft-core drilling.

The ball bearing at the top of the drill, indicated by *T*-83, *T*-84 and *T*-234, is a steadying device with valuable functions. The protecting ring *T*-83 almost fills the bore-hole and is held stationary by bearing against the wall. The parts *T*-84 and *L*-2 rotate on the balls; but the action is so smooth that there is no perceptible jar and no grinding against the walls of the bore. The protecting ring, filling the hole, prevents the wabbling of the drill and the breaking of the core into small pieces.

The practical utility of this new scheme of core drilling in soft materials has been effectually demonstrated, and this pioneer work opens up new possibilities in the field of soft-coal prospecting.

The standard drills of the Davis system provide for depths of 3,000 ft. Greater depths can be handled by special equipments. In America the greatest depth drilled by the Davis system has been 1,500 ft, at Virginia City, Nev., and in Nova Scotia. In Australia this drill has put down bores 3,100 ft. deep.

The largest hole provided for in standard machines is 10¼ in. in diameter, yielding a 9-in. core; the smallest is 2⅝ in. in diameter, yielding a 1⅝-in. core. Ordinarily a uniform diameter can be carried down. But when a layer of soft or caving material is encountered, which requires a casing, this calls for a reduction in size of cutter to pass through the casing.

Rates and costs of "core drilling without diamonds" are difficult to secure, since the operators are averse to making public the performance of their equipment. But in one instance marble was drilled at the rate of 33 ft. per 10-hour shift at a cost of 27c. per ft. This included frequent moves and the cost of an additional pumping plant necessitated by the distance of the drill from a water supply. Sandstone is so variable in hardness and texture that no general statements can be made. In some cases the rate has been 45 ft. per day; in others, 7 or 8 ft. per day. The cost in these instances varied from 30c. to $1.50 per ft. The average rate in granite is 10 to 12 ft. per day, and the cost about $1.25 per ft. The hand-power drills of the Davis system require a gang of five men. On small and medium sizes of power drills two men only are needed. The larger power drills require three men.

The Straits Tin Mines.

The senior warden of the Federated Malay States reports that the output of tin in 1904 amounted to 856,238 piculs, as compared with 841,993 piculs in 1903, showing an increase of 14,245 piculs over that of 1903; of this amount, 533,193 piculs were exported as tin ore, against 496,504 piculs in 1903, showing an increase of 36,690 piculs.

On the other hand, 323,045 piculs were exported as block tin, smelted locally, as compared with 345,489 piculs in 1903, showing a decrease of 22,444 piculs.

The industry does not now seem to be attractive, and the warden believes it would be good policy for the Government to endeavor to make the industry more attractive.

Perak continues the premier producer of tin in the Federated Malay States. The mines at Tronoh and Tambun still continue their prosperous careers, and further developments of the deposits at these two mines have justified the managers in employing further labor-saving appliances. At Papan, fine machinery has been erected by the Pusing Lama Company; on the adjoining block, Mr. Osborne is about to erect a modern plant. The hydraulic companies in the Gopeng district continue to do well, noticeably the original Gopeng Co., which started work in 1892. Kumpar, after a rather bad period of depression in 1903, is now flourishing again.

In Selangor, after a period of trouble at the beginning of the year, the labor force settled down quietly and gives no further trouble. Serendah, a prosperous mining camp of 1896-1902, seems now about worked out. Rawang, on the other hand, still employs some thousands of laborers. Between Rawang and Serendah a new station has been opened at Sungei Chu, and there are now some hundreds of laborers employed; the land, however, is pockety and uncertain.

In the Kuala Lumpur district, deep mines are being opened up on the old worked-out shallow fields, and a modern plant is being erected. At Kajang three mines have been opened up, the richness of which almost vies with that of Tambun and Tronoh. The development of these mines has tended to prove the ex-

istence of lodes in the vicinity. If the alluvium in the vicinity is any criterion of the value of these lodes, they must be remarkably rich.

In Negri Sembilan, the hydraulic mines cannot be said to have been altogether successful last year. Poor ground may be partly responsible for this result; but during the greater part of the year, water was also scarce. At Membau, below Rasah, on the Linggi river, an important mining camp has sprung up, and there is a strong tendency for this field to extend lower toward Kuala Sawah. On the boundary between Negri Sembilan and Selangor, Broga, where thousands of placer miners were once working, there is now only an old waste worked by a few "fossickers." At Mantin and toward Batang Benar, large placer mines have been opened up.

Jelebu seems on the downward grade, but the construction of the new road to Pahang may resuscitate the fallen fortunes of this district. On the coast, at Lukut (probably the oldest tin field), after abandonment for years, some hundreds of laborers are working alluvial deep mines and on "lampans" (barges).

Though there is a small increase in its output, Pahang has made but little progress. Steps have been taken to develop the Kuantan, Blat and Lepar districts, and during the next two or three years the output from these places may increase.

Compound Centrifugal Pumps.*

BY WILLIAM FRECHEVILLE.

A new development, which has come under my notice of late, is the use of compound centrifugal pumps for high lifts. A large plant of this kind for pumping about 1,000 gal. per minute from a depth of 1,450 ft. was put in a few years ago by a French company which owns the important silver-lead mines at Horcajo, Province of Ciudad Real, Spain. The total height of 1,450 ft. was accomplished in four lifts, each lift being done by a quadruple centrifugal pump, driven by a three-phase motor. These quadruple pumps consist of four pump-discs on the same shaft, and in the same housing or case, each disc being calculated to lift about 125 ft., and delivering its water to the next, which in its turn imparts an additional and equal impulse or push. By this system it is found possible to raise water to heights which a few years ago would have been considered impossible for centrifugal pumps.

In the case of the Horcajo mines the lifts are about 400 ft. each, but much greater single lifts have been successfully accomplished in more recent installations by placing two such compound centrifugal pumps in tandem, the second taking the water from the first and imparting further impulse to it. It is stated that water is being raised about 1,200 ft. in one lift by this means in a colliery in Germany.

The silence and ease with which the large quantity of 1,000 gal. a minute is raised at Horcajo by a comparatively small plant at each station is very impressive. The absence of all valves and small moving parts in the pump, and of brushes or other small moving parts in the three-phase motor, and the further fact that the pump and motor run at the same speed and are on the same shaft, give great simplicity; this, combined with the flexibility of electric-power transmission, points to a large sphere of usefulness for such pumps in the future.

When the plant was first installed at Horcajo, it was thought the wear and tear of the pump-discs might be a serious trouble, but this has not been found to be the case. I saw discs which had been in use a considerable time and which showed very little wear. Considerable precautions, however, have been taken by means of screens to keep any coarse particles from finding their way into the bottom pump; and, moreover, there are two settling-tanks below the bottom of the level at some distance back from the cistern, and these tanks or channels are used alternately, one being in use while the settlings are being cleaned out of the other. The ball-bearing thrust-blocks of the pump appeared to be the principal cause of anxiety; but I am informed that in the more recently constructed pumps a better balance has been effected.

As regards efficiency, the makers guarantee that 68% of the power given out by the motor when running at its proper speed shall appear in water pumped. According to the data supplied at Horcajo, the coal consumed per water-horse-power hour amounted to about 2.2 kg., say, 4.8 lb., equivalent with the quality of coal used to about 34 lb. of steam, and the whole plant—at surface and underground—is said to have an over-all efficiency of about 50% as measured by the water pumped. In a recent tender for such a plant which came under my notice, a well-known first-class firm, using Parsons' turbines in the generating station, offered to guarantee a coal consumption of 3.66 lb. per water-horse-power hour, and stated that if gas-engines were used the coal consumption would be about 2.7 lb. for the same work.

In order to compare these figures with the results which are being obtained by large Cornish pumping plants, it may be mentioned that the ordinary Cornish engine is stated by authorities on the subject to use from 3.5 lb. to 3.75 lb. of good coal per water-horse-power hour. Somewhat higher efficiency than this has at times been claimed, and the more recent compound engines using high-pressure steam are stated to be using only from 2.5 lb. to 3 lb. of coal. A weak point at present in connection with these high-lift centrifugal pumps is that they have not yet been used successfully for sinking. The trouble appears to be that they lose their water when going "in fork." Efforts are being made to overcome this difficulty, but I have not learned with what success. At Horcajo they use Cornish bucket lifts, worked by motors and gear underground, for sinking below the lowest station. Another feature which might be somewhat of a drawback under certain circumstances is that, like all centrifugal pumps, to get a good efficiency they must be driven at a certain speed, and if this speed is departed from, the efficiency falls off very rapidly.

*Notes from presidential address before Institution of Mining and Metallurgy.

Blast-Furnace Reactions.

The decomposition of two volumes of carbon monoxide in the blast-furnace into carbon and one volume of carbon dioxide is a reversible reaction depending on the temperature and on the presence of reducible metallic oxides. At 445° C. the decomposition is complete; but at 1,000° C. it is scarcely appreciable. In the presence of nickel or cobalt oxide, the carbon monoxide becomes converted into carbon dioxide simply by taking oxygen from the metallic oxide. There is no alteration in the volume of the gaseous mixture such as there would be if the foregoing reaction had occurred. In the case of nickel oxide, the amounts of decomposition of the monoxide at 445°, 360° and 320° C. are 80, 91 and 96%, respectively. The reactions take place somewhat differently in the case of the oxides of iron. As soon as a certain proportion of carbon dioxide is produced, this gas oxidizes some of the iron reduced by the monoxide, thus regenerating this gas and metallic oxide. The monoxide then undergoes decomposition into carbon and carbon dioxide. This series of changes recurs successively until all the monoxide has been decomposed, the carbon being set free while the oxygen remains combined with iron (*Stahl und Eisen*).

The interaction occurring between iron and carbon dioxide has been studied by Schenck and Heller (*Berichte der deutschen chemischen Gesellschaft*, 1905, p. 2,132), who have found that, when ferrous oxide is heated with carbon in the absence of indifferent gases, complete reduction can occur only when the pressure of the reduction gases is greater than that of the atmosphere. This condition is attained at temperatures varying from 650 to 775°, the exact point depending on the kind of carbon employed. In the blast-furnace, the partial pressures of the oxides of carbon cannot, on account of the nitrogen present, exceed 250 mm. The reduction of the ferrous oxide can occur only at temperatures at which the partial pressure is greater than this; that is, at temperatures above 695° C. In the presence of manganiferous iron, the limiting temperature of reduction is raised appreciably.

The modern method of operating machine tools continuously and scrapping them as soon as they become obsolete is typical of the effort to utilize all facilities to the utmost limit.

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CONTENTS.

Editorials:
Notes 833
Mica 833
River-Bed Mining 833
British Steel Production 834
The Hazel Kirk Colliery Accident 834
The Mountain Copper Company 834
Drainage of Cripple Creek 834
Indiana Coal Rates 835
The Re-working of Old Mines 835
The Mines of Rhodesia ..... *J. H. Curle* 817
*Drainage of the Cripple Creek District, *D. W. Brunton* 818
Coal Mine Accidents in Great Britain 822
Safety Lamps 822
Metallic Calcium 822
*The Aerial Tramways at the Silver Cup Mine ..... *George Attwood* 823
Cargo Sampling and Analysis of Iron Ore, *W. J. Rattle and Son* 824
*The "Deepwater-Tidewater" Railroads, *George W Harris* 826
Mica ..... *Phillips Thompson* 828
Electrometallurgy of Antimony, *Anson G. Betts* 829
Tin Mining in Indo-China 829
*Recent Improvements in Core Drilling Without Diamonds,, *Lucius I. Wightman* 830
The Straits Tin Mines 831
Compound Centrifugal Pumps, *William Frecheville* 832
Blast-Furnace Reactions 832
Iron Mining in the Lake Superior Country ..... *Otto C. Davidson* 838
A New Ontario Iron-Ore Field 839
Metallics 836
Colliery Notes 837
Correspondence and Discussion:
The Electric Furnace and Magnetic Iron Sands ..... *W. H. Adams* 837
New Publications 839
Questions and Answers 840
Abstracts of Official Reports:
United States Mining Company 841
Patents Relating to Mining and Metallurgy 841

Illustrated.

DEPARTMENTS.

Chemicals and Minerals 858
Coal Markets 854
Construction News 843
Dividends and Assessments 863, 864
Industrial Notes and Trade Catalogues 843
Iron and Steel Markets 856
Obituary 841
Personal 841
Metal Markets 859
Mining News 843
Mining Stocks 862
Societies and Technical Schools 842

THIS JOURNAL DOES not ordinarily notice political events, as they are for the most part outside of its special field and purpose. The recent changes in Russia, however, are of such wide importance that we cannot avoid saying a word with regard to them. The grant of free—or comparatively free—government is something so entirely new for the Russian people that it will necessarily take some time to prove its effects. Nevertheless, we are quite confident that this will open a new era, not only in the political, but in the material development of the country, and that its great mineral resources will at last have a chance for adequate exploitation, not in the interest of the autocracy, nor for a few powerful favorites, but for the benefit of the whole people. We wish our Russian friends all success in the new era which is opening before them.

THE MINERS of tungsten ore in the district near Randsburg, in Kern county, California, which is a desert section of the State, are beginning to get unexpected reward for their work. One firm, McCarty & Taylor, shipped a carload to Germany for which they have received $8,000, while the total cost of production and shipping did not exceed $900. Other shipments are to follow at once. Philip Mertz and McCurran, who own the Opportunity claim, are getting out ores running as high as 72 per cent, and sacking the ore for shipment. Shipments of ore to Germany will continue, and it is now proposed to put up a plant to concentrate the ores of lower grade. The ore thus far shipped has been of a high grade.

THE TRANSFER of that prominent investigator, Mr. Spurr, from the staff of the United States Geological Survey to that of the exploration companies represented by the Guggenheim interests, emphasizes the modern tendency toward the utilization of the specialist for his special work. Comment thereon is so apt that it is almost gratuitous, but incidentally it is worth while to note the tribute paid by business men to the commercial value of technical work.

THE ARTICLE BY Mr. Curle on Rhodesia, which appears on another page, gives rather a discouraging view of that district, for which such high hopes were entertained when it was first opened to settlement. Mr. Curle's views, however, seem to be fully supported by the recorded facts, and we do not doubt that he has given the district all the consideration to which it is entitled. The mines of Rhodesia have been, as a rule, small. The attempt to follow ancient workings, probably made by the Arabs several centuries ago, has resulted in almost universal disappointment, the veins being small and comparatively poor, while few or none of them equaled in depth the surface showing. Only two or three important mines have been developed, or are likely to be developed, in Rhodesia, and those are not of the first order. In fact there seems to be nothing of much importance in the gold mining way in Africa, north of the Transvaal, unless something should be developed by exploration in the Zambesi country.

Mica.

The article on Mica, which is to be found on another page of this isue, is not to be called an abstract, but rather a description of the excellent monograph on that subject which has recently been issued by the Bureau of Mines of the Dominion of Canada, under charge of Dr. Haanel. The purpose of these monographs, to give in convenient form the knowledge on a given subject, especially as applied to the mineral products of the Dominion, is an excellent one; and in this volume and in the companion one on Asbestos, which has also been issued recently, the purpose has been well carried out. The monograph on Mica will be an interesting one to many people. The mineral is one which is found in many places, and is really widely distributed, but at the same time the number of deposits which are of commercial value is comparatively small. This fact has caused much disappointment to people who have imagined that they had discovered or secured valuable mica properties. A reading of this monograph will dispel some of the common delusions on this subject, and will give explorers an idea of what a workable mica deposit really is, and thus enable them to avoid waste of time and money in endeavoring to open mines which are without practical value.

River Bed Mining.

One of the important mining enterprises under way in California at present is the tunnel at the horseshoe bend of the Trinity river, which is to carry the waters of that stream through a narrow neck, and

leave the river bed bare and ready for the miners for a distance of more than two miles. The tunnel will be 400 feet long, and about half of it is completed. It is expected that a rich return can be secured.

This plan of river-bed mining has been profitable in many cases in California. The wing-dam system, by which small areas of river bed are laid bare, has been a paying one, for the most part. Strange to say, however, in a number of places where longer stretches of river have been opened, the work has not generally been so successful. A number of instances could be cited, especially the work at the Big Bend of Feather river, and the large enterprise on the same stream above Oroville. It is to be hoped that the Trinity river will show better results, and thus establish a new precedent.

British Steel Production.

The production of steel in Great Britain for the first half of the current year, like that of pig iron, showed a considerable increase, indicating an active condition of the trade. The figures of output furnished by the British Iron Trade Association are as follows, in long tons:

	1904		1905	
	Tons.	Per Ct.	Tons.	Per Ct.
Bessemer.....	865,683	34.1	1,019,887	34.0
Open-hearth ..	1,670,129	65.9	1,980,095	66 0
Total	2,535,812	100 0	2 999,982	100.0

There was an increase of 154,204 tons, or 17.8%, in the make of bessemer ingots, and of 309,966 tons, or 18.6%, in that of open-hearth steel; the gain being 464,170 tons, or 18.3%, in the total output. The changes in proportion are slight, but they are still in favor of the open-hearth process, by which nearly two-thirds of the British steel is made. The ratio of steel to pig-iron production for the half-year was 64.9, a figure much lower than in Germany and the United States.

The division of the make of steel ingots into acid and basic was as follows:

	Acid.	Basic.	Total.
Bessemer...	698 836	321,051	1,019,887
Open-hearth.....	1,627,698	352,397	1 980,095
Total.....	2,326,534	673,448	2,999,982

This shows that 77.5% of the make was acid steel, and only 22.5% basic. The basic open-hearth furnace is not in as much favor in Great Britain as in this country; on the other hand, the basic converter is used to a considerable extent. The division shows the comparatively small use of high-phosphorus ores in England.

The output of finished steel is not yet reported, except in a single article. The quantity of rails made from bessemer steel in the half-year was 540,314 tons; an increase of 16,543 tons, or 3.3% only, over the first half of 1905. These were all made from bessemer steel, about 55% of that description of steel going into the form of rails.

The Hazel Kirk Colliery Accident.

The superintendent and five minor officials of the Hazel Kirk colliery, 18 miles east of Pittsburg, which is owned by the Pittsburg & Westmoreland Coal Company, lost their lives in the mine on Oct. 29. It appears that a fortnight ago an explosion resulted in a portion of the workings catching fire. The burning portion was isolated by closing the entry, and was flooded with water. After the interval, the superintendent, desirous of seeing whether it was possible to reopen the mine, decided to make an inspection. Everything proceeded satisfactorily until the closed entry was approached. Then the incautious order was given to tear down the bulkhead confining the fire, with the result that the pent-up gas immediately "fired," causing another terrific explosion, which instantly killed five men and severely injured another, who shortly afterward succumbed. The accident was the result of inexcusable carelessness in opening the isolated area before adequate arrangements were made for dealing with the dangerous gases that must have been expected to collect during the interval the mine was closed. The inspection was undertaken without the consent of the State mine inspector, and in defiance of the State mining regulations. This regretable affair once more emphasizes the fact that a large proportion of the casualties in coal mines are due to the victims' own negligence.

The Mountain Copper Company.

The injunction granted a few months ago by the United States Circuit Court against the Mountain Copper Company, of Shasta county, Cal., will shortly come up on appeal in the United States Court of Appeals in San Francisco. Upon the results of that appeal, depends to some extent the future course of the company at Keswick. Should the injunction be sustained, the smelter will probably not start up again; should the injunction be dissolved, the company will resume operations at the smelter, but on a different plan than that formerly employed. This mining company, in point of production and number of men employed, is the most important in California.

It will be remembered that suits for damages from fumes caused the removal of the larger part of the smelting plant from the vicinity of the mine in Shasta county to the upper bay shore of Contra Costa county. A peculiar feature in the matter is that the Shasta Board of Trade has now adopted a set of resolutions, setting forth that smelter fumes do little harm to vegetation, and that smelters are a blessing. These resolutions may be presented to the Court of Appeals, though how this can be done with propriety remains to be seen. While these resolutions will hardly figure in the Court's decision, they doubtless express a compromise offered by the county in an official manner. If this had been done earlier, it might have prevented litigation and the removal of the plant.

In this connection it may be stated that Shasta county, which for several years, by reason of the heavy output of copper, had led the counties of the State in gross value of mineral output, took second place last year, being surpassed by Kern county. With the new Great Western and Mammoth smelters in operation, Shasta hopes to take the lead again in mineral production.

Drainage of Cripple Creek.

The report of Mr. D. W. Brunton which appears in this issue of this JOURNAL, is worthy of study for several reasons. Mr. Brunton is a representative engineer, not only of Colorado but of the West in general, and his long and wide experience, together with his able judgment on engineering proposals of ambitious magnitude, will insure a careful perusal of his report. The plan to drain Cripple Creek for deeper exploitation of seemingly permanent orebodies involves an undertaking which would be a matter neither novel nor surprising when contemplated from the viewpoint of large-tunnel engineering in itself; but it is a matter of more than passing congratulation when a producer with interests as large and varied as those of Cripple Creek, combines all its energies in a new drainage tunnel which shall relieve and stimulate the production of the whole district. It goes without the saying that the very proposal to construct this drainageway implies a firm faith in the ore reserves of this district, and by those

best qualified to judge. Ten years ago, we used to see the wise ones shaking their heads and hear them muttering confidentially that the days of this camp were numbered; that, at the most, fifteen years more would show the visitor to Bull Hill, only the decaying remnants of former activity. But the optimist is wiser than the pessimist; and this proposal to drain the whole district, if it means anything, indicates that the score or two of listed producing mines are still to be counted on for several decades. Moreover, the tonnage rate will be increased, not lessened. In sober judgment, the business outlook of the district is all that gives point to the engineering work, which will be comparatively easy and should be accomplished with the maximum of economy, and with minimum of cost and time. Incidentally the coming improvements in ore treatment will change much material from the rating of the dump pile to the classification of pay ore. Doubtless all this has been anticipated by the committee of Cripple Creek mine owners. It will afford much interest to watch the progress of this projected work.

Indiana Coal Rates.

A Western decision on coal rates has just been rendered, which in effect justifies a discrimination in coal rates. It is, apparently, based on a common-sense view of the equities and necessities of the case, rather than on a strict interpretation of the law.

Finding that an increase in the freight rates on Indiana coal would not only ruin the manufacturing industry in the gas belt, but would also prove disastrous to the mining interests of the State, the Indiana Railroad Commission has decided that the three rates of coal from the Indiana mines to the cities of the gas belt, now in force, do not constitute a discrimination within the meaning of the law, and will be allowed to remain. The commissioners base their opinion upon the principle that the manufacturer, who receives a 60-cent rate a ton on coal, is not in the same class as the private consumer, who is required to pay an 85-cent rate; this difference being due to the fact that the manufacturer sends a great deal of out-bound freight from his factory, and this to an extent reimburses the railroad company for any loss that may have accrued to it owing to a coal rate below cost. The private consumer, it is claimed, does not ship out any product; hence, on coal shipments to him, the railroad companies must make a profit. The Indiana law provides that carrying companies must charge every shipper the same "for doing a like and contemporaneous service in the transportation of a like kind of traffic under similar circumstances and conditions."

Under the complaint the question arose as to whether or not, with this provision of the law in mind, a carrier can lawfully make a lower rate on coal to manufacturers who produce something for him to carry out, than for domestic consumption or for steam power for interurban and electric light plants that provide no outgoing business. The Indiana Commission answers in the affirmative, and decides that the 60-cent rate to manufacturers, 75-cent for the steam-power user and the 85-cent rate to the domestic consumer, will prevail.

This is the most important decision the Commission has made, affecting as it does the manufacturers of the gas belt, who threatened to dismantle their plants if the rate was raised; and also the output of coal from the mines. It is now quite certain that other manufacturing cities outside the gas belt will raise the question with the Commission that a relative low coal rate would be as acceptable and equitable to them as to the gas-belt cities, and the contention will probably lead to a readjustment of rates all around.

The Re-working of Old Mines.

One of the most interesting features in mining in the Western States at the present time is the rejuvenation of many of the famous old camps, some of which had been entirely abandoned. This has been due to several causes, the chief of which are improved methods in mining and smelting, the greater appreciation of the value of possession of the raw material as a basis of metallurgical undertakings, and in some cases the reconciliation of previously inharmonious interests; the last is to a large extent a natural sequence of the first two reasons. In some districts for example, where profitable mining was dependent upon combined action in the pumping of water, a common source of disagreement, appreciation of the increased profit to be realized by modern methods of mining has led to consolidation of previously conflicting interests, as at Tombstone, Arizona, and resumption of operations with the aid of fresh capital.

The mines of Bingham Cañon, in Utah, were among the earliest worked of the base-metal mines west of the Rocky Mountains, their active exploitation having begun immediately after the completion of the Pacific railroad. They were operated originally as silver-lead mines, but while they still produce lead ore, their present great value is derived from their resources in copper. The occurrence of the latter was not a new discovery, but its ore, of which there are two kinds, was so low in grade as to be for a long time considered valueless. Improved methods in mining and smelting enabled the pyrites to be worked profitably, and recently the exploitation of the lower-grade disseminated ore has been undertaken with great promise of success.

Leadville never became a dormant camp, but there was a time when its productiveness fell off heavily. In respect to tonnage it is now as large as—if not larger—than at any time in its history. This is due in no small degree to improvements in mining and milling methods, which have restored several important properties to the ranks of dividend-payers. Leadville's famous predecessor—Eureka, Nevada—which was decaying when Leadville was waxing to its zenith and for the last ten years has been apparently dead, is now to be reopened in a tentative way under a management which has brought together the old Eureka and Richmond interests.

We are prone to consider our great mining districts as short-lived in comparison with the historic mining districts of Europe, like Freiberg, Clausthal, Falun and others; but in spite of our intense exploitation fewer have been worked to the end of their resources than has been supposed. Our early mining in the West, before extraction and transportation facilities were as economical as they are now, was extremely wasteful. In robbing the mines of their richest ore and then promptly abandoning them, many were ruined that would be profitable today. It does not often pay to work over a mine that has been robbed. The treatment of our mineral resources has been, however, only on a par with that of other of our natural resources, and was inevitable under the conditions of development of our great Western domain. A different era, with different conditions, has now arrived.

Metallics.

The word "miniature" is derived from minium, red lead; it was originally used to denote the decorative illuminations of manuscripts, which were colored with this pigment (or with cinnabar, formerly often confounded with it).

Antimonial lead used to sell at a discount from the price of ordinary desilverized, sometimes as much as ⅛c. per lb. lower; but now, in view of the high price of antimony, it commands a premium of about 1c. per lb. over the price of lead.

An alloy largely employed by the William Cramp & Sons Ship & Engine Building Co. is composed of iron 62%; tin 32%; and manganese 6%. It is employed as a medium for introducing the tin and manganese into copper to form a manganese bronze.

At Butte, both in the Herreshoff and Klepetko furnaces, the proportion of dust appears to be 4 to 6% of the weight of the ore. This necessitates the installation of proper dust chambers or other means for its collection, and involves the rehandling of so much material.

For oxidizing silver jewelry there is nothing that equals platinum. The platinum solution is simply applied with a brush to the part it is desired to oxidize and the whole is then dried. The color produced is a dense black and adheres tenaciously. The solution is prepared by dissolving sheet platinum in aqua regia and diluting to form a 1% solution.

Attention has been called to the remarkably high percentage of cadmium in some American spelters, certain brands showing as high as 0.5%. Opinions differ as to whether the presence of that impurity is objectionable in the employment of such spelter in brass manufacture, but the consensus apears to be that it is unobjectionable except possibly in special cases.

One of the first laboratory syntheses of an "organic" compound was effected by Wöhler in 1828, when he prepared urea from ammonium cyanate, the transformation taking place spontaneously. Since then, organic chemistry has made marvelous progress. In the latest German edition of Richter's *Dictionary of Organic Chemistry*, there are nearly one hundred thousand compounds listed.

Steels with low percentages of carbon and nickel (pearlitic steels) are now largely used in the construction of motor-cars; medium steel, steels low in carbon, and with high percentages of nickel are used for valves; chromium steels with high carbon and low chromium percentages are used for bearings, silicon steels for springs and gearing, and nickel chromium steels with low percentages of nickel and of chromium are employed for parts requiring resistance to shock, and a certain degree of hardness.

Brass chips and turnings from engineering works, after being cleaned and sorted, are carefully stirred into a crucible already partly filled with molten metal. In this manner excessive oxidation is avoided and loss is kept down to the lowest possible amount. When this method is carefully carried out, yellow brass chips can be melted with as little as 5% loss. In England a common practice is to turn the chips into empty clay crucibles and allow them to remain in the furnace for 10 or 12 hours so that they may run down or "settle." This method is much more wasteful than the American, and results in a loss of from 15 to 20% in the skimmings.

American brands of desilverized lead generally show more bismuth than corresponding brands of lead refined in Europe. Analyses of five brands of American lead showed from 0.00124 to 0.10746% bismuth. Bismuth is the most objectionable of the common impurities in pig lead that is to be used for the manufacture of white and red leads. The limit commonly imposed in America is a content of 0.025% bismuth. Certain European authorities hold that it should not exceed 0.02%. There are certain quick processes of white-lead manufacture, however, in which the percentage of bismuth in the pig lead is considered to be immaterial.

The lowering of the freezing-point of water, produced by one molecular equivalent ("mol") of any non-electrolyte, is 1.86° C.; and the corresponding elevation of the boiling-point is 0.52° C. Thus, 60 grams of urea, 46 g. of common (ethyl) alcohol, or 342 g. of sugar, respectively, when dissolved in 1 liter of water, will show this effect on the freezing or boiling of water. In the case of electrolytes, the depression of the freezing-point and the elevation of the boiling-point, respectively, are much greater, due to the supposed dissociation and the consequent formation of a larger than normal number of solution active molecules or ions. Electrolytes include all the more active and soluble acids, bases and salts.

Iron decomposes zinc sulphide at 1,167° C. The reaction is very slow at that temperature, but if the iron be molten it proceeds with great vigor. At a temperature slightly above the melting point of cast iron, *i. e.*, 1,250° C., zinc sulphide is almost completely decomposed by the theoretical quantity of iron. Carbon begins to decompose zinc sulphide at 1,200° C., but it is much slower than iron in its action. At 1,300° C., however, the decomposition of zinc sulphide by carbon takes place, given sufficient time. This reaction is not advantageous to the condensation of the zinc vapor, since it reverses to some extent in the condenser, forming zinc sulphide and soot, which prevent particles of molten zinc from coalescing.

Mechanical draft installations, as against the permanent stack, require more items of expense charged to them than are commonly considered. In the brick chimney or steel stack the charges are: First cost, interest on the investment, repairs (including painting, if steel stacks are used) and depreciation. The latter figure may be taken at 10% for steel stacks, assuming that they will stand ten years if kept painted; the depreciation for the brick stack may be taken at 2%, though it is not apt to amount to even so much as that. Against the mechanical draft installation, the following items must be charged: First cost, interest on the investment, operation (including oil and waste), power consumption, repairs and depreciation. The depreciation will be at least 10% in most plants, but the power consumption may be reduced in the proportion in which the exhaust from the fan engine may be needed for heating feed-water.

The modern McDougall furnaces are the simplest of the mechanical furnaces. They can be satisfactorily tended by any ordinarily intelligent labor. Machinery is at a minimum and the parts most subject to destruction are easily and cheaply replaced. Neither the furnace masonry nor the stirring mechanism is subject to strains from sudden and unequal expansion or contraction from the alternate heating and cooling of parts. They are more economical of labor, fuel and power than any other mechanical furnace. They can desulphurize to any desired degree, their capacity being governed chiefly, as in other furnaces, by hearth area, speed of the rakes, and means of conserving and applying the heat. The movement of ore toward the center or the periphery of the alternate hearths practically overcomes the difficulty of securing an equal travel for the ore, which is experienced in circular furnaces of a single hearth. The successive falls of the ore from one hearth to the next tend to effect a thorough mixture, while the oxidation of the ore appears to be promoted by showering through the ascending current of hot air.

The modern theory of solution rests on arguments drawn from the following: (1) The depression of the freezing-point; (2) the elevation of the boiling-point; (3) the osmotic pressure of a dissolved substance; (4) the degree of chemical activity of solubles; (5) the relative conductivity of the electric current in solutions. In addition to these points, there are many special arguments; such as the varying concentration of electrolytes about the anode and cathode, respectively; the specific rate of "migration" of the ions; the adaptation of molecular weights (as derived from methods suggested by the foregoing) to the general system of making and unmaking of compounds. But probably that phase of the argument which will appeal to most practical students is that the "ions," on which so much emphasis is laid, are only the part molecules which are exchanged in the common equation writing of qualitative analysis.

Colliery Notes.

A mixture of equal weights of peat and British coal has been used on an extensive scale during the past year on the State locomotives in Sweden. The railway authorities recently purchased 9,300 tons of peat for this purpose. The high freight rates prevent its general use except in the immediate vicinity of the places of production.

In England many coal retailers use bags made of coir yarn. Their durability is unaffected by the weather, and being made of a very tough material, sharp lumps of coal will not cut them. The bags are made by the blind, and each is woven in one complete piece, without any raw edges. The handles are of coir rope, and are stitched on with tarred twine.

Carbon monoxide is probably the prime cause of more than 80% of the deaths resulting from a coal-mine explosion. This gas is largely, if not entirely, generated by the partial oxidation of coal dust. If coal dust could be removed from coal mines as fast as it is produced, the danger from explosions would be very considerably reduced.

The bituminous coal used in grate fires in some of the Southern States furnishes an example of the value of an adequate air supply. The combustion in this case is almost perfect; the smoke generated is confined almost entirely to the period of kindling the fire, and after the coal has once begun to burn brightly is not visible. This, of course, will not be the case if the bars are clogged up or if for any other reason the air supply is restricted. This coal is chiefly from the Pocahontas field.

Coal storage and re-handling can be effected with minimum danger from spontaneous combustion by a gantry crane or bridge that traverses the storage pile. The coal is handled in this case by a clam-shell bucket that runs on the line of the bridge, the bridge travel itself being at right angles to its length. This makes it possible to reach any part of the pile with the bucket, and allows of the immediate removal of the coal from above any overheated portion of the pile; consequently, that portion may then be reached and the danger removed.

Very little attention has been given by Indian colliery owners to coal-cutting machines. At present only two coal mines in the Empire are employing them. Nearly all the coal is won by the room and pillar system, and the pillars are rarely extracted. Native labor is used in mining, and its cheapness has probably prevented enterprise in the use of the machines. The natives are good miners, and have shown themselves capable of managing coal-cutting machines. Mining costs are low, but there is apparently no reason for doubting that the introduction of cutting machinery would be financially beneficial.

In the museum of Edinburgh University, placed side by side in a glass case, are the lungs of an Esquimaux, a coal miner, and a native Londoner. The first are pinkish white and the second *black*, while the organs of the dweller in the city are a dirty brown. This exhibit will serve to show how important ventilation is, viewed from the standpoint of health. While it is not practicable to obtain such perfection that the colliery manager may insure the attainment of the lighter color, it is still possible to effect very great advances in the ventilation, and in the diminishing of dust. The latter may do as much, or more, harm than even insufficient ventilation.

The introduction of electrical power in coal mines is retarded by the fear of danger arising from short-circuiting. There are two substances in the earth's crust capable of passing electric currents: (1) metals laid in, or on, the surface; and (2) aqueous solutions in the pores of the strata. When separate conductors carrying power for the electric locomotives, and coal-cutting machinery, are laid in the same roadway, there is constant danger of the current from one system escaping to the other, as when the insulation is damaged. This is a frequent cause of serious accidents in mines giving off gas, or having much coal dust in the workings and roadways.

Coal crushers, as used in power plants, are not always made in such form that they will allow the passage of bits of steel and other foreign substances without damage. On this account we sometimes hear of stripped gears and broken blocks that could be prevented by using crushers made with the give-and-take motion that is used on rolls used for ore-crushing. We do not recall having ever seen the gyratory crusher used for coal crushing, and yet it should, in the nature of things, give results as good as those commonly obtained in stone crushing. If any reader of this column knows of a case where the gyratory crusher has been used for this work, we would be glad to have his views on the subject.

With an increased depth in colliery workings there is a higher natural temperature, and fires and large outflows of gas have to be guarded against. For safety it is frequently necessary to provide duplicate ventilating fans and engines able to produce from 160,000 to 500,000 cu. ft. of air per min., and it is often advisable to so arrange that, in case of emergency, the ventilators can be connected with either shaft. As regards motive power, electricity at present is not sufficiently safe to be used in any place where the least danger is likely to occur, and it is sometimes more practical to recommend compressed air for underground workings, as they would then be safe from blowing fuses and sparking.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Electric Furnace and Magnetic Iron Sands.

Sir—Your readers will no doubt be interested to learn that smelting of iron sands by means of the electric arc has begun in a quiet way at the pavilion of the Geological Survey, Lewis & Clark Exposition grounds in Portland, as a completion of the work carried on during the summer months.

C. E. Willson, of Virginia, one of the members of a family famous for introducing electric smelting processes for manufacture of carbide of calcium, ferro-chrome, ferro-silicon, etc., arrived in this city last week and on Wednesday, Oct. 19, in the afternoon, his furnace was fired for the first time and an initial warming up and fusion of a complete charge of iron sand with the proper fluxes, took place within three hours in the presence of a few interested parties. Since that date the furnace has been run regularly each day with a production of pig iron, and the details of working to best advantage are being carefully evolved with the idea of the erection of a larger furnace at an early date. The statement is made that this larger furnace will turn out pig iron on a commercial scale and at prices about the same as now ruling in the East.

During the five months last past, magnetic iron sands have accumulated at the pavilion, donated by owners of placer mines and placer beaches, in all sections of the Western States, in response to the appeal of the Geological Survey. These sands have been worked for their several products, over tables and magnetic machines, and their values have been classified and tabulated for reports to be made hereafter. The information given out so far by the officials in charge of the experimental work, show these sands to contain gold, platinum, magnetite, chromite, scheelite, monazite, zircon, and other minerals. Many of the samples contain sufficient gold to pay for all costs of extraction of the other metals and minerals; others have produced sufficient magnetic iron to pay all these costs, leaving the gold, etc., as profit.

In the case of placer sands, it is to be expected that more or less value can be recovered by careful concentration, but the great surprise in the series of tests seems to have been the enormous tonnage of magnetic iron sands reported from certain sections of the Coast. At the mouth of

the Columbia river there is an area of unknown extent where the magnetic iron sands have been concentrated by wave action for ages. This magnetic oxide, substantially free from all deleterious substances, is stated to be found at great depths and evenly distributed, so that it is safe to estimate that there are hundreds of millions of tons to be secured by simple dredging and concentration.

These magnetic sands are the same as found along the Atlantic Ocean in unlimited quantities, the natural product of the breaking down of great deposits of iron ores, such as found in northern New York, in New Jersey, Pennsylvania, Maryland, Virginia and North Carolina.

At the mines in northern New York probably 50,000 tons monthly is produced in the granulated form, the so-called "fines," a product of concentration by jigs and magnetic separators. These fines are graded from ¼ in. to 0.01 in. mesh and are therefore equivalent in grades to the beach sands to which they may be compared. For many years past these fines have been considered a bugbear to the furnaceman, but at the present time furnaces are running both in New York and New Jersey by the use of this class of fine iron ore almost exclusively, and the pig iron turned out is high grade.

When we consider that the consumption of iron and steel in the States contiguous to this Pacific Coast, is at the rate of $100,000,000 annually, and that not one ton of pig iron is turned out west of Colorado; that freights from the eastern iron centers are at the rate of $12 to $15 per ton; that much of the pig iron comes from Europe; that 200,000 tons of pig iron, in addition to double that tonnage of scrap, is used by the 250 foundries in the States named, it would seem only necessary to place these facts before commercial bodies to insure the utilization of the enormous resources in iron to be found close at hand.

The facts as stated above are not new, but the attention of the public is being called to them in a way never before attempted, by the expenditure of Government funds on this Pacific Coast for exploitation of methods and processes supposed to be in the line of practically solving the problems of securing iron ores and making iron or steel. The daily press records the starting up of this electric furnace and the production of a few pounds of pig iron, as "an epoch-making demonstration."

During the experiments at the pavilion this summer, we have been educating ourselves in a metallurgical sense, by perusal of the unusually exhaustive literature issued by the Canadian government, the most comprehensive treatise on electric smelting ever brought to the notice of professional men. I refer to the "Report of the Commission appointed to investigate the different electro-thermic processes for the smelting of iron ores and the making of steel in Europe," published by the Department of the Interior, Canada.

The conclusions of the Commission and the recommendations have already borne fruit, and we are likely to have settled at an early date the fact that electricity is suitable for the smelting of iron sands, by experiments now being conducted at Sault Ste. Marie, Canada, under the direction of M. Héroult, which success in Europe is sufficient warrant for his appearance in this country to continue experiments for the Government.

If the work of the officials of the Geological Survey at the Lewis & Clark Exposition this summer, gives to the world no commercial results on the lines laid down in their introductory circular, it will yet be an investment of incalculable value to the Western States and their natural allies in the Orient, should the work done by the electric furnace attract the attention of metallurgists and financial people to the field now open along the Pacific Coast for manufacturing enterprises based on iron and steel. Conceding that we have the quantity and quality of iron sands necessary for the making of a great industry, it would be sufficient for the present to duplicate the successes of the charcoal and coke furnaces of the Northern Iron Company at Port Henry, N. Y., but the inauguration of electric smelting plants would place us in a position of absolute independence at a time when the world is wondering from whence the stocks of iron ores are to come during the next decade.

W. H. ADAMS.

Portland, Ore., Oct. 21, 1905.

Iron Mining in the Lake Superior Country.*

BY OTTO C. DAVIDSON.

The invitation to hold the Institute on the Menominee range this year was given with many misgivings, for we feared that we would not be able to show you much in the way of mines or mine equipment, because two meetings have already been held on this range, and most of you are familiar with our plants. Personally, I advocated the postponement of the meeting until next year in the hope that we would be able to arrange a more interesting program, as the concentrating plant of the Pewabic will, I understand, be in operation next summer. This plant was fully described in a paper by Mr. Hardenberg, and read at one of our meetings, but I think few members have seen the plant in operation, and as it is the only plant for the concentration of iron ore in the Lake Superior region it is unusually interesting.

The Penn Iron Mining Co. will have the hydraulic power plant at Sturgeon Falls in running order, by the use of which they will generate sufficient power to almost entirely eliminate the use of steam in their mines at Vulcan and Norway. We think that the work preliminary to harnessing and utilizing this fine water power will be interesting to all mining men. . . .

I believe the greatest benefit of these meetings is in the oportunity they afford to meet and become acquainted with each other, and have heart-to-heart talks in which we tell of our trials and tribulations, and learn that others have troubles also; that we are not the only ones whose ore is too low in iron, or too high in phosphorus, silica, manganese, sulphur, or something else; whose ores are too hard or too soft, or the capping and hanging wall is so hard that it will not cave as wanted, or whose walls are so soft that it is impossible to keep drifts and crosscuts open, because the pressure is so great that no timber will stand for a long time. There are innumerable difficulties that must be met, and if one remains at home he is apt to think he is getting more than his share of trouble. . . .

I think all mine superintendents in Lake Superior districts have cause to feel grateful that the ability and character of their employees, mechanics, miners and laborers are all that could be desired. They are absolutely loyal to employers, fearless in time of danger, and unsparing of brawn in the hard work called for in mining operations. Power drills, steam shovels and haulage plants have reduced the hard work of mine employees somewhat, but there is still much work that can be accomplished only by severe manual labor. There are, of course, those who are merely looking for payday, but they are the exception, and it is one of the duties of a mine superintendent or captain to see that the energetic, capable men do not suffer on account of those who shirk, for it is not possible to entirely weed out this undesirable class.

We should be quick to recognize energy and ability, and remunerate it so far as lies in our power. The man who works the hardest does not always accomplish the most; the most successful is he who uses his brain and plans his work ahead, even if he is but shoveling. And if it is advantageous to think and plan while engaged in ordinary labor, how much more necessary is it that those who have the direction of work for others, should have plans well matured and probable contingencies considered and provided for.

I am sure much benefit is derived from these meetings through discussions that come up between members as they visit the different ranges and mines. Nearly every mine has conditions peculiar to itself, and much may be learned from those who have been compelled to meet and master those conditions. Mining work has a peculiar fascination which I encountered when I first engaged in it, but there are also cares and anxieties. However, I always return from out Institute meetings enthusiastic, and glad that my work has

*Presidential address, delivered at the meeting of the Lake Superior Mining Institute, Oct. 17, 1905.

to do with mining. This liking extends to my family, as you will see by a remark made by my youngest son, at the age of five years. He said to me, "Papa, when we are born we are not boys, are we? We are just babies; then we are boys, then men, and then miners."

A New Ontario Iron-Ore Field.

SPECIAL CORRESPONDENCE.

What are known as the Moose Mountain iron-ore deposits of central Ontario are passing into the hands of those who will actively exploit them. A railroad is to be built at once from or near the little village of Killarney, on the north shore of Georgian bay, to these orefields, a distance of about 70 miles. Ore-shipping piers are to be erected on the bay, and the distance from these piers to lower lake ore-receiving ports will be less than from any of the upper lake shipping ports, on the American side of the lakes, even less than from Escanaba, on Lake Michigan. A minority interest in these ore lands has been sold by Messrs. John C. Spry, of Chicago, and C. S. Osborne, of Sault Ste. Marie, for a sum that makes the entire property worth about $2,500,000, and the buyers are negotiating for another small interest. These buyers are the great Canadian railway-building firm of Mackenzie & Mann, projectors of the second Canadian transcontinental road, the Canadian Northern. This line now extends northwest from Lake Superior to the foothills of the Rocky mountains, and several hundred miles to connect tidewater and the western line are under way at this time. This line passes a few miles south of the Moose mountains, and by a slight deflection may be made to touch the new district.

Chief owners in this district at present are Messrs. Jos. Sellwood, of Duluth; J. T. Gates, I. L. Lambert and J. J. Mitchell, of Chicago; Blair & Co., of New York, and Mackenzie & Mann. The latter, in connection with their purchase, have made a rate on ore to Georgian bay that permits the unloading of ore at Lake Erie ports at a freight charge of about $1 from the mines, rail and lake rate combined. This varies little from the Escanaba rate, but is 50 to 60c. less than that from the western end of Lake Superior. The connection of Mr. Gates with this enterprise has a bearing on the probable use of a part of the ore to be opened.

The Moose mountains are in the township of Hutton and unorganized territory, in the district of Nipissing, along the West Branch of Vermilion river, and outcrop as bold bluffs of ore and jasper. It has been stated by mine experts, sent there to make examination, that there are more than 10,000,000 tons of 60% and better ore exposed above the 250-ft. level from the top of the bluffs, and that of lower merchantable grades there are many times as much. The opening of mines will be a matter of quarrying and several properties can be shipping mines as soon as the railroad connection is made. There is very little moisture in this ore, about 2%, and all the ore is magnetic, running better than 60% iron and from 0.05 to 0.07 phosphorus.

The ore was discovered by a prospector from Sault Ste. Marie about three years ago. He communicated his find to Mr. Osborne, who, in turn, went to Capt. Sellwood with it. The latter interested his friends, and the total amount that has been spent upon the properties since the first discovery has been less than $200,000. The deposits extend for 30 to 40 miles, but the ownership of the lands along the better part thereof has been for some time in the hands of the men mentioned above, who have formed companies for handling them. Up to the present time all work done has consisted in locating the properties, securing titles, getting surveys, road building, camp erection, diamond drilling, trenching, test-pitting and crosscutting. This work has cost more than $100,000. The ore is said to be very low in sulphur and has no trace of titanium, while it is very hard and close-grained, requiring crushing to adapt it to furnace needs.

New Publications.

International Mining Directory. A. R. Dunbar, Editor. Pages, 97 + 53. 8 by 10½ in., cloth; $10. Denver, Colorado: The Smith-Brooks Printing Co., 1905.

Annual Report of the Smithsonian Institution for the year ending June 30, 1904. Pages, 804; illustrated. 6 by 9 in., cloth. Washington, D. C.: Government Printing Office, 1905.

Underground Waters of Salt River, Arizona. (Water-Supply and Irrigation Paper No. 136, U. S. Geol. Survey.) By Willis Thomas Lee. Pages, 196; with illustrations and maps; 5¾ by 9 in.; paper. Washington, 1905: Government Printing Office.

Miocene Foraminifera from the Monterey Shale of California. (Bulletin No. 268, U. S. Geol. Survey.) By Rufus M. Bagg, Jr. Pages 55, with illustrations and plates; 5¾ by 9 in.; paper. Washington, 1905: Government Printing Office.

Observations on the Ground Waters of the Rio Grande Valley. (Water-Supply and Irrigation Paper No. 141, U. S. Geol. Survey.) By Charles S. Slichter. Pages, 83, with illustrations; 5¾ by 9 in.; paper. Washington, D. C., 1905; Government Printing Office.

Geology of the Central Copper River Region, Alaska. (Professional Paper No. 41, U. S. Geol. Survey.) By Walter C. Mendenhall. Pages 135, with maps and illustrations; 9 by 11½ in.; paper. Washington, D. C., 1905: Government Printing Office.

Contributions to the Hydrology of the Eastern United States. (Water-Supply and Irrigation Paper No. 145, U. S. Geol. Survey.) By Myron L. Fuller. Pages 220; 5¾ by 9 in.; illustrated; paper. Washington, 1905: Government Printing Office.

Journal of Engineering. No. 1. 1904-1905. By the engineering societies of the University of Colorado. Pages, 89; illustrated; 6 by 9 in.; paper. Boulder, Col., 1905. Published annually by the University.

Contents.—Applications of the funicular polygon to continuous loads, Arnold Emch. Multiple-voltage speed control for motor-driven machine tools, Lucius I. Wightman. The differential telephone, Charles A. Lory and Claude C. Coffin. Compounding of rotary converters, Joseph L. Burham. Size differences of bolts and nuts for "V" and standard threads, George R. Moore. An insulator test, Stanley D. Coffin. Some hints on a camp outfit, Winfield Holbrook. A large electromagnet for optical and surgical work, Harry E. Sovereign. Some graphic methods for calculating the deflection of beams, Milo S. Ketchum. Building stones, R. D. George. Coal analysis, Avery Leavitt. Surveying at the University of Colorado, Howard C. Ford. The principle of water-wheel design, Norman Read. Specifications for levels and transits, Howard E. Phelps and Edwin R. Weeks.

This is a series of papers of various composition and quality, but, in general, evincing a thorough acquaintance with technique, and a commendable spirit of productive ability. In particular we would note the paper by Dr. Emch, that by Lory and Coffin, and the practical article by Mr. Moore.

Die Elektrochemie der organischen Verbindungen. (Third revised and enlarged edition.) By Walter Löb. Pages, 320; 5½ by 8½ in.; paper; $2.75. Halle, Germany, 1905. Wilhelm Knapp.

Die Elektrolyse geschmolzener Salze. Part 1. Compounds and Elements. By Richard Lorenz (professor of electrochemistry and physical chemistry in the Polytechnikum at Zurich). Pages, 217; illustrated; 6¼ by 9½ in.; paper; $2.50. Halle, Germany, 1905. Wilhelm Knapp.

Mica. By Fritz Cirkel. Ottawa, 1905. Pages, 148; with illustrations and maps; 6½ by 9½ in.; paper. Published by the Mines Branch, Department of the Interior, Canada.

A convenient assemblage of information respecting the "occurrences, exploitation and uses" of mica. We shall refer more fully to this monograph elsewhere.

Economic Geology. Vol. I. No. 1. A semi-quarterly journal devoted to geology as applied to mining and allied industries. Editor, John D. Irving; associate editors, Waldemar Lindgren, Heinrich Ries, James F. Kemp, Marius, R. Campbell, Frederick L. Ransome, Charles K. Leith. Pages, 100; 6½ by 10 in.; illustrated. Lancaster, Pa. Oct.-

Nov., 1905. 50 cents per copy; $3 per year. The Economic Geology Publishing Co.

This new publication promises to occupy worthily an unappropriated field and we take occasion to extend our wishes for all success that such an undertaking implies.

Commercial Economy in Steam and Other Thermal Power-Plants. By Robert H. Smith. Pages, 291. Illustrated. 6½ by 10 in., cloth; $7. London, 1905: A. Constable & Co., Limited; Philadelphia: J. B. Lippincott Company.

Contents: Introductory; product; profit and economy; commercial economy co-efficient. Dynamic and thermal action; physical data; furnace, boiler and engine efficiencies. Costs; capital outlay and working expenses; steam, gas, and oil plants; electric-power stations; depreciation. Kinetic energy and resilience; kinetic transpower and resilient transpower. Irreversibility and heat transpower; stress and strain specific heats. Analysis into thermal and mechanic elements; dynothermic co-efficient. First adjustment of size for maximum economy; dynothermic co-efficients of steam. Work, heat and costs of actual indicator diagrams. Partial limit values of bulk, initial pressure, and back pressure for maximum commercial economy. Combinations of best values for maximum commercial economy. Furnace temperature and working speed for maximum economy. Tables and diagrams.

This volume constitutes a monument to the industry and patience of the author, and is an incentive to the admiration and patience of the reader, or, we should say, the student; for it must be followed, word for word, in order to derive the lasting benefit that an authoritative book on this subject provides. We cannot but admire the elaborate treatment, both of the text and of the tables and diagrams; in this latter is found the chief value of the book. It is unfortunate that the American edition retains the English money units; it renders the use of the tables more cumbersome, and introduces unnecessary complications. The tables too often require the looking up of pages of text before they can be used, and this also detracts from the usefulness of a book that is in other respects thoroughly commendable.

Select Methods in Quantitative Analysis, Chiefly Inorganic. By Byron W. Cheever (late acting professor of metallurgy, University of Michigan) and Frank Clemes Smith (former professor of metallurgy in the South Dakota School of Mines). Fourth edition, revised and enlarged. Parts I and II. Pages, 273, illustrated; 5¼ by 9 in.; cloth. $2. Ann Arbor, Mich., 1905: George Wahr.

A clear, concise statement of standard practical methods. Mr. Smith has done an acceptable service in keeping this work of the late Professor Cheever up to date.

Minerals in Rock Sections. Revised edition. By Lea McI. Luquer, Adjunct professor of mineralogy, Columbia University, New York. Pages, 147; illustrated, with table. 6 by 9¼ in.; cloth. $1.50. New York, 1905; D. Van Nostrand Co.

This new edition of "the practical methods of identifying minerals in rock sections with the microscope" is essentially a reproduction of the original volume, but with careful revising of certain parts (Chap. I and IV); together with many incidental additions, cuts, tables, etc., in various parts of the book. In petrography the book is much like Moses and Parsons' digest of mineralogy. Petrography is quite technical and may easily be a useless fad in mining geology. This treatise by Luquer presents the essentials in convenient and practical form. It would, however, be more than a luxury if such plates as that on page 137 were reproduced in accurate color tints. But of the high authority and good service of this *vade mecum* there is no doubt.

Geology of the Tonopah Mining District, Nevada. By Josiah E. Spurr. Pages, 287; with illustrations and maps; 9 by 11½ in.; cloth. Washington, D. C., 1905. United States Geological Survey.

Contents: Outline of paper. Introduction. General geology. Mineral veins. Present subterranean water. Physiography. Descriptive geology of mines and prospects. Rock alteration connected with mineralization. Origin of mineral veins. Increase of temperature with depth. Comparison with similar ore deposits elsewhere.

This book is an exhaustive, timely and valuable treatise on the special district of Tonopah proper. In addition to the many worthy qualities of the customary Survey reports, this monograph presents a new feature which is particularly commendable; we refer to the digested outline of the paper which it presents as a preface. This outline will serve not only as a help for the hasty reader, but also as a convenient introduction for those who have time to study the book with the care that it deserves. We shall note elsewhere the subject matter of the volume with more generous attention.

The Building Estimator. By William Arthur. Pages, 186. Illustrated. 4½ by 6½ in. Cloth, $1.50. Omaha, Nebraska. William Arthur, 1905.

Contents.—Approximate estimating. Detailed estimating. Excavation. Piling. Concrete. Stonework. Brickwork. Municipal work. Fireproofing. Plaster. Carpenter and joiner work. Millwork. Glass. Structural steel and iron. Tin, galvanized iron, copper. Roofing. Painting. Hardware. Plumbing and gasfitting. Heating and lighting. Tiling. Odds and ends. Standard sizes and grades. A standard engine-house. Square- and cubic-foot prices. Price-book. Reinforced concrete and cement stone. Hints on house building. Cottages in Spain.

This book is not only a profitable one to study; it is also pleasant to read. The author has an individuality that makes itself shown throughout, and a style that is distinctly entertaining. It is not often that this can be said of publications of this class, most of which are an assembling of prices of more or less accuracy and of but little more. The book is a modest one and will prove of benefit not only to the contractor (for whom it was primarily written), but to the engineer or to anyone that may be engaged in building.

The defects seem to be confined to unusual methods of abbreviations, making it necessary to refer to the list more often than should be the case; also a too local treatment in some particular instances. In the author's preface the statement is made that books are sometimes sent from publisher to publisher for many months and at last rejected, and that the author never sent this work from home, but concluded to publish it himself. We do not believe this book would have been returned; at least not until the proof was ready for revision.

Questions and Answers.

Molybdenum Ore.

Is the molybdenum produced in the United States derived from molybdenite or from wulfenite? How is molybdenite concentrated? What would be the loss in the tailings in making a 50% concentrate? Has any vein of molybdenite, as narrow as three inches, been worked? What is the demand for molybdenum ore? Why is copper considered detrimental to the ore? What other impurities are also detrimental?

Answer.—The molybdenum so far produced in the United States has been chiefly from molybdenite. Some wulfenite has recently been produced, however, in the Little Cottonwood district of Utah.

Molybdenite in quartz is concentrated in approximately the same way as graphite is concentrated. Physically, molybdenite and graphite are quite similar, except in their specific gravities, which are 4.7 and 2.2, respectively. We should not venture to indicate to you what the tailings might be in the production of a 50% concentrate; it would depend very much upon the character of the crude ore. The loss of mineral in slime is likely to be large. The concentration of molybdenite has proved to be a troublesome matter in many cases. We are informed that the Elmore oil process has been successfully used with this ore. The application of the electro-static separator to the problem ought to be investigated.

So far as we are aware, no vein of molybdenite as narrow as three inches has been worked. The mining of a three-inch vein of the pure material would cor-

respond approximiately to that of a 3½-ft. vein carrying 7% of the material.

The market for molybdenum ore is limited, as you may judge from the statistics of production.

Copper is detrimental to the ore, because it is detrimental to steel, in connection with which metallic molybdenum is employed.

Dredges on the Snake River.

Will you kindly advise me whether there are any placer dredges operating for gold extraction on the Snake river in Idaho? A. D. T.

Answer.—There are at least two on Moore's creek, a tributary of the Snake, and probably some on the main stream.

Abstracts of Official Reports.

United States Mining Company.

The annual meeting of this company was held in Portland, Me., on Oct. 18. President Evans reported that the company's net earnings for the 16 months from March 1, 1903, to June 30, 1904, were $1,045,719, and for the 12 months from July 1, 1904, to June 30, 1905, were $1,092,987. The net earnings during the last 12 months were affected by the breakdown of the blowing engines and by several stoppages incident to improvements made at the Utah plant. The liabilities were as follows:

*Capital stock (484,200 shares)..	$12,105,000
Bonds and accrued interest.....	602,728
*Notes, advanced on bullion and current accounts.....	2,001,823
Surplus.....	311,723
	$15,021,274

*After payment for stock of DeLamar Refinery, but before issuing new stock of United States Mining Company.

This company and its subsidiary companies own a group of mines in Bingham, the Centennial-Eureka mine at Tintic, a lime quarry believed to be large enough to supply all the lime rock needed for smelting in Utah, the Mammoth mine in Kennett, Cal., a copper and lead smelter in Utah, a copper smelter at Kennett and a controlling interest in the DeLamar refinery at Chrome, N. J. All these properties are in active operation, except the Kennett smelter, one furnace of which has just started.

Managing Director Holden says in his report: "The orebodies in the Jordan have improved during the year, and the grade and the quantity are better than a year ago. The favorable termination of the litigation which tied up a portion of this property for the last three years will make available a large tonnage of lead ore. It has also released some good bodies of copper iron. Prospecting in this mine will now be resumed. During the year the Galena shaft was sunk to the 400-ft. level, and this level was run north and south. Developments were better than we anticipated.

"The Centennial-Eureka mine is in fully as good condition as a year ago. Our orebodies have been opened to the 1,400-ft. level and have proved at this depth to be as large and as high grade as on the levels above.

"At the United States smelter six copper furnaces and three lead furnaces, in addition to 10 roasters and one reverberatory furnace, are in operation. The entire plant is working smoothly and the promises for the future are excellent.

"Five additional roasters are being completed for the lead plant, and five more will be built. Orders have been given also for doubling the number of lead blast-furnaces. During the year from Oct. 1, 1904, to Oct. 1, 1905, the smelter produced 71,445 oz. of gold, 2,107,956 oz. of silver, 14,965,438 lb. of copper and 10,200,826 lb. of lead, with a total value of approximately $5,300,000. Much improvement has been made in controlling the flue dust losses, thus eliminating a large factor in the so-called smoke trouble in Salt Lake valley. The large supply of custom ores that we are offering will necessitate the building of a third sampling mill."

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Oct. 24, 1905.

802,368. GRINDING OR POLISHING GEMS.—Clyde Coleman, Chicago, Ill.

802,374. ACTUATING MECHANISM FOR ORE-CONCENTRATORS.—Emil Deister, Fort Wayne, Ind.

802,395. FREIGHT-CARRYING SHIP OR VESSEL.—Gerald E. Holland and Henry Johnston, Rangoon, India, assignors to the Holland-Johnston Patents, Ltd., London, England.

802,399. MINERAL WASHING AND SEPARATING APPARATUS.—James H. Lancaster, New York, N. Y.

802,407. GRINDING-MILL.—Juljan Rakowski, Warsaw, Russia.

802,493. PROCESS OF REDUCING METALLIC OXIDS.—Thomas S. Blair, Jr., Woodmere, N. Y., assignor of one-half to B. C. Lauth, Pittsburg, Pa.

802,516. PROCESS FOR MANUFACTURING ARTIFICIAL FUEL.—Josef Knops, Aix-la-Chapelle, Germany.

802,517. FURNACE FOR THE CONTINUOUS HEATING OF METAL OBJECTS WITHOUT OXIDATION.—Carl Kugel, Werdohl, Germany.

802,521. WELL-DRILLING MACHINERY.—Mert McCain, Portland, Ind., assignor of one-half to William E. Brown, Muncie, Ind., and one-half to William McCain, Jay county, Ind.

802,541. MINER'S PICK.—Frank N. Wilson, Cripple Creek, Colo., assignor of one-half to George D. Kilborne, Cripple Creek, Colo.

802,608. MANUFACTURE OF LIME AND SAND BRICKS OR BLOCKS.—Ernst Stoeffler, Zurich, Switzerand.

802,620. METHOD OF TREATING SOLID MATERIALS.—Kristian Birkeland and Samuel Eyde, Christiania, Norway.

802,631. APPARATUS FOR BURNING PORTLAND-CEMENT CLINKER.—Thomas A. Edison, Llewellyn Park, N. J.

802,724 CENTRIFUGAL CONCENTRATOR.—Phineas H. Adams, Chicago, Ill., assignor, by mesne assignments, to Title Owners Company, a corporation of Maine.

802,725. CENTRIFUGAL ORE-SEPARATOR.—Phineas H. Adams, Chicago, Ill., assignor, by mesne assignments, to Title Owners Company, a corporation of Maine.

802,750. BEARING FOR SUBAQUEOUS AND OTHER SHAFTS.—James H. Gray, San Francisco, Cal.

802,759. SAFETY DEVICE FOR ELEVATORS.—Charles W. Hoffman, New York, N. Y.

802,777. GRINDING-ROLL.—George B. Nutt, Pittsburg, Pa.

802,778, 802,779 and 802,780. CENTRIFUGAL SEPARATOR.—Wilbur H. Peck, Chicago, Ill., assignor, by mesne assignments, to Title Owners Company, a corporation of Maine.

802,799. MINER'S CANDLESTICK.—Tom W. Conklin, Mullan, Idaho.

802,842. CRUSHING-MACHINE.—Arthur Cameron, Chicago, Ill., assignor to National Drill & Manufacturing Company, Chicago, Ill., a corporation of West Virginia.

802,870. WELL-DRILLING MACHINE.—Walter R. Martin, Barberton, Ohio, assignor to National Drill & Manufacturing Company, of Chicago, Ill., a corporation of West Virginia.

802,880. OIL-WELL PACKER.—Thomas W. Phillips, Jr., Butler, Pa.

802,925. EXCAVATOR.—Walter Ferris, South Milwaukee, Wis., assignor to the Bucyrus Company, South Milwaukee, Wis., a corporation of Wisconsin.

802,931. GAS-PRODUCER.—Jerome R. George, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a corporation of Massachusetts.

802,941. PROCESS FOR THE REDUCTION OF METALLIC OXIDS AND THE SEPARATION OF THE RESULTING METALS.—Auguste J. Rossi, New York, N. Y., assignor, by direct and mesne assignments, of forty-two and one-half one-hundredths to James MacNaughton, Tahawus, N. Y., and fifteen one-hundredths to Philip C. Peck, New York, N. Y.

802,960. ELECTROLYTIC APPARATUS.—Frank J. Briggs, Everett, Mass., assignor of one-sixth to George F. Tarbell and one-sixth to Henry A. Locke, Cambridge, Mass.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Oct. 14, 1905.

21,922 of 1904. STAMP-MILL.—J. T. Dawes, Prestatyn, Wales. In stamp-mills for dry crushing, arranging blasts of compressed air to impinge on the space over the anvils when the shoes are raised, so that the crushed ore is blown upon screens at the discharge mouth and the coarser particles thus returned to the mortar.

23,036 of 1904. PURIFICATION OF ALUMINUM SULPHATE.—Peter Spence & Sons, Manchester. Purifying aluminum sulphate made from bauxite, by adding a potash salt and boiling, thus precipitating the iron.

23,963 of 1904. SAFETY DEVICE FOR MINE CAGES.—J. H. Nicholson, Blyth, Northumberland. Improved safety suspending apparatus for mine cages.

24,523 of 1904. ROCK-DRILL.—T. Warsop, Comston. Improved percussive rock-drill, which is operated by a small gas-engine, the drill being pressed back against a spring by a cam actuated by the engine.

24,557 of 1904. ROCK-DRILL.—Armaturen & Maschinenfabrik, Westphalia, Gelsenkirchen, Germany. Improvements on feeding and rotary hand rock-drills.

1,581 of 1905. TUBE-MILL.—W. H. Trewartha-James, London. In tube-mills, introducing the pulp by means of a perforated pipe extending along the top of the interior of the mill, and having exits for the fine ground pulp all round and along the periphery of the mill.

6,439 of 1905. WHITE-LEAD PROCESS.—A. Wulize, Charlottenburg, Germany. In making white lead by acting on acetate of lead solutions by means of carbonic acid, conducting the operation under atmospheric pressure and using an atmosphere of carbonic-acid gas.

7,599 of 1905. REFRACTORY LINING FOR FURNACES.—J. Bach, Riga, Russia. Making refractory linings for furnaces by mixing 20 parts of pure hydrate of alumina with 80 parts of ordinary fire-clay, and applying the mixture, while moist, to the thickness of an inch, and then burning.

8,808 of 1905. ROASTING-FURNACE.—F. Klepetko, Great Falls, Montana, U. S. A. Improvements in the inventor's roasting-furnace, dealing chiefly with the water-cooling devices of the McDougall type of furnace.

10,983 of 1905. TUBE-MILL.—P. T. Lindhard, New York. In ball- and tube-mills, interposing a screen drum between the two ends of the drum, so as to return the coarser particles from the discharge end.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. B. B. Lawrence is at present in Colorado.

Mr. F. H. Minard has returned to Denver from New York.

Mr. N. H. Emmons, 2d, of Oaxaca, Mexico, is in Globe, Arizona.

Mr. S. S. Palmer, president of the New Jersey Zinc Co., is in Europe.

Dr. Edward D. Peters, of Boston, has returned from his European trip.

Mr. Wm. W. Thompson, of Oaxaca, Mexico, is in St. Louis on business.

Mr. Simon Guggenheim has taken up his residence in Denver, permanently.

Mr. Anton Eilers, of the American Smelting & Refining Co., is in Europe.

Mr. J. J. Waterson, of Chihuahua, Mexico, is in Denver on professional business.

Mr. John Hoatson, known all over the copper-mining regions, was in Colorado last week.

Mr. Franklin W. Smith, mining engineer and chemist, of Bisbee, Ariz., is at Duluth, Minn.

Mr. C. W. Purington, of the firm of Doveton & Purington, of Denver, Col., is now at Sunrise, Alaska.

Mr. James W. Neil, consulting engineer for the Pittsburg company, operating in Butte, is in San Francisco.

Mr. Herman A. Keller, of New York, who formerly had charge of the Parrot smelter in Butte, is in Butter, Mont., on mining business.

Prof. Willett G. Miller, Ontario provincial geologist, has returned to Toronto from a tour of the Animikie iron range and other districts.

Mr. V. G. Hills was in San Francisco last week on his way home to Cripple Creek from Arizona, where he has been examining a copper property.

Mr. George A. Guess, recently at Silverton, Col., has been appointed chief chemist for the Cananea Consolidated Copper Co., at Cananea, Sonora, Mexico.

Mr. Ben B. Thayer left Butte for New York on Oct. 28. He spent three weeks inspecting the mines and smelters of the Amalgamated Copper Co. in Montana.

Dr. A. E. Barlow and Mr. Joseph Keele, of the Canadian Geological Survey, are in British Columbia, engaged on the investigation of zinc deposits of that province.

Mr. J. H. Trerise has returned to Butte, Mont., after an absence of a year in South Africa. He has again assumed his old position of consulting engineer for United Copper.

Prof. J. Dunraven Young has just returned from Montana, where he has been making an examination of mining properties in the Phillipsburg district for Milwaukee capitalists.

Mr. H. W. Hardinge is in New York, having recently returned from professional work in Brazil, where he has been investigating deposits of alluvial gold and diamond washings.

Mr. A. H. Tarbet, of Salt Lake, is in Butte, Mont., on mining business. He was formerly a resident of Butte and sunk the shaft of the Anaconda mine from the 100 to the 300-ft. level.

Mr. Arthur Warren has resigned his position as manager of publicity for the Allis-Chalmers Co., and will sail for Europe about the end of November on a journalistic mission.

Mr. George B. Motheral, a director of the Pittsburg & Montana Copper Co., returned to his home in Pittsburg on Oct. 23, after having spent 10 days at the company's property in Butte.

Mr. B. W. Kirkpatrick, who has been on the Mesabi and Gogebic iron ranges for the past month, investigating power conditions for the General Electric Co, has returned to Schenectady.

Mr. C. H. McCullough, Jr., has been elected a vice-president and the general manager of the Lackawanna Steel Co., with headquarters for the present at the works at Buffalo, N. Y.

Mr. Ralph Baggaley, manager for the Pittsburg company in Butte, will be in Pittsburg about Oct. 25, for the purpose of consulting with the officers of the company in regard to company affairs in Montana.

Mr. C. A. Bohn, general manager of the Encinillas Mines, Ltd., Santa Rosalia, Mexico, has asked to be relieved of his contract with said company Jan. 1, instead of continuing and completing the same to July, 1906.

Mr. Howard Willets and Mr. A. W. S. Cochrane, of New York, stockholders in the Silver Fissure Co., which is operating the Polaris mine in Beaverhead county, and is preparing to instal a blast-furnace at the mine, are in Montana.

Mr. John M. Bush, of the Ashland, mine, Ironwood, Mich., has been appointed superintendent of the Crosby mine, Mesabi range, the two being operated by the Cleveland Cliffs Iron Co. The Crosby is to be opened for mining next year.

Mr. O. H. Bergstrom, the well known chemist and metallurgist of Butte, was in New York for a few days last week. He is returning with his family from Sweden (where he has been temporarily on professional business) to resume active work in Montana.

Mr. George W. Winter, of Butte, Mont., was severely injured recently. He was on his way from Boulder to visit some mines in the Elkhorn district, when the team ran away, and Mr. Winter was thrown from the wagon, injuring his leg seriously.

Mr. C. H. MacMillan, late superintendent of the open-hearth steel plant at Ensley, Ala., was recently at Sydney, N. S., making an inspection of the open-hearth department of the Dominion Iron & Steel Co., in view of improvements contemplated for enlarging the output.

The Governor of Georgia has appointed the following State delegates to the American Mining Congress at El Paso: Prof. S. W. McCallie, Joel Hurt, Atlanta; John Martin, Nacoochee; Frank Moore, Dahlonega; J. R. Van Buren, Griswoldville; J. R. Barber, Cedartown; M. T. Singleton, Rising Fawn; Sam Tate, Tate; D. G. Purse, Savannah; Claude Estes, Macon; J. J. Calhoun, Cartersville; John P. Stegall, Emerson; R. E. A. Hamby, Clayton.

Obituary.

John B. Hornical, superintendent of the Pittsburg & Westmoreland Coal Co.'s Hazel Kirk colliery, near Pittsburg, was killed by an explosion in the mine on Oct. 29. Mr. Hornical was one of the original owners of the mine and at the time of his death held a large interest in the Pittsburg & Westmoreland Co. Five minor officials of the mine lost their lives in the same accident.

Societies and Technical Schools.

Massachusetts Institute of Technology.—A large Wetherill magnetic separator is to be set up in the mining laboratory for studying the magnetic separation of the so-called black sands of the Pacific coast. Prof. R. H. Richards worked for the greater part of the past summer in Portland, Ore., experimenting upon the concentration of these sands in the interest of the United States Geological Survey. Dr. C. H. Warren is in charge of the mineralogical determination of these sands.

On Oct. 12 the Mining Engineering Society held its first meeting of the year. Mr. J. H. Bachellor, who has been engaged in cyaniding work in the West for the past five years, gave an instructive lecture on cyaniding in the Black Hills. Mr. Bachellor devoted his attention principally to the location and details of construction of the mills.

Prof. R. H. Richards leaves next week to inspect the new magnetic concentrating plant of the Pennsylvania Steel Company.

National Association of Cement Users.—The yearly convention will be held in Milwaukee, Wis., Jan. 9-12, 1906. A. Moensted, fourth vice-president, is the

local representative of the association, and will be in charge of local arrangements. A number of good papers are promised for the meeting.

American Mining Congress.—To the meeting at El Paso (Nov. 14 to 18), the Atchison, Topeka & Santa Fé railroad offers a rate from Chicago (to all stations east of Las Vegas, N. M.) of one fare, plus $2. This makes the round-trip rate, Chicago to El Paso and return, $45.75; tickets to be on sale Nov. 10, 11 and 12, with final return limit of Nov. 25, 1905, and tickets good leaving El Paso until, and including, the latter date. By depositing the ticket with the joint agent on or before Nov. 16, and payment of fee of 50c., which will include execution fee at time of deposit, an extension of return limit until Dec. 25, 1905, may be obtained. The Mexican Central railway, on Nov. 19 and 20, will sell round-trip tickets from El Paso to Mexico City and return at rate of $28; also to Guadalajara and return for same amount, limited to 30 days from date of sale.

Trade Catalogues.

"Aetna Dynamite" is a catalogue by the Aetna Powder Co., Chicago, Ill.

A. Leschen & Sons Rope Co., St. Louis, Mo., issues a flyer on the subject of wire rope.

The Portland Cordage Co., Portland, Ore., issues its new catalogue No. 4 and cipher code.

A. P. Lundberg, Liverpool Road, London, N., sends us his catalogue of "Lektrik" supplies.

The Denver Fire Clay Co., Denver, Col., issues its new catalogue of assayers' and chemists' supplies.

The Chicago Pneumatic Tool Co., Chicago, Ill., issues its catalogue of air-cooled Duntley electric drills.

The National Battery Co., Buffalo, N. Y., issues three bulletins and several flyers relating to its product.

The Emerson Monthly for October, 1905, is issued by the Emerson Electric Manufacturing Co., St. Louis, Mo.

The United Iron Works Co., Springfield, Mo., issues its catalogue of Cleveland-Knowles electro-magnetic separators.

Hughes Bros., Scranton, Pa., issue flyers describing their miners' safety lamps, sight indicators and general supplies.

Kolesch & Co., 138 Fulton street, New York, issue a new illustrated catalogue and price-list of drawing and surveying instruments and accessories.

The Stanley-G. I. Electric Manufacturing Co., Pittsfield, Mass., issues its bulletin No. 409, describing switchboards for small direct-current plants.

The Wellman-Seaver-Morgan Co., Cleveland, O., issues its new catalogue of iron and steel works equipment, Section "E," relating largely to cranes.

The Jeffrey Manufacturing Co., Columbus, O., issues its bulletin No. 10, describing the Jeffrey mining locomotives as arranged for electrical operation.

The Allis-Chalmers Co., Milwaukee, Wis., issues bulletins relating to single-stage centrifugal pumps, high duty horizontal double-acting plunger pumps, McDougall roasting furnaces, the Hancock jig, and sawmill machinery. Of these the latter is the most complete and of, perhaps, most interest to engineers.

"The Westinghouse Companies in the Railway and Industrial Fields" is an illustrated brochure on the subject of the work of the associated companies. It includes descriptive matter referring to the air brake, the electric traction brake, the semaphore signal as installed on electro-pneumatic systems and electrical apparatus generally.

Industrial.

The S. H. Supply Co. has removed to 18th and Lawrence Sts., Denver, Colo.

The Nevada Consolidated Copper Co., of Nevada, has contracted with the Allis-Chalmers Co. for a battery of six McDougall roasting furnaces, each with six hearths.

The quarterly report of the president to the shareholders of the Chicago Pneumatic Tool Co., under date of Sept. 30, 1905, shows a quarterly dividend of $61,137 and a surplus of $106,915.

The Daly Reduction Co., of Hedley, B. C., is in the market for machine tools. Houses handling stamp mill and cyanide plant equipment and filter presses are also requested to send catalogues.

The Miners' Foundry & Supplies Co., of Cartersville, Mo., will build and equip a foundry. A 10-ton cupola, with crane and traveling trolley, ladle, etc., arranged for future extension, will be installed.

George L. English & Co., of New York, dealers in rare minerals and mineral specimens, have sold their entire business to Ward's Natural Science Establishment, 104 College avenue, Rochester, N. Y. The two establishments are now combined.

The rolling mills of the Western Iron Mills Co., near Burnham, Colo., have been completed and are ready for operation. They have a capacity of 100 tons a day of rails, bars and angles, scrap iron being utilized. The new plant cost $250,000. Warren C. Bogue is general manager.

The United Steel Co., Canton, O., is building an addition to its plant consisting of a steel building, 80 by 180 ft., and two smaller structures. Electric cranes and other modern appliances will be installed. The company intends to make a specialty of universal mill plates from 14 to 48 in. wide and up to 80 ft. in length.

The Yampa Smelting Co. has just closed a contract with the Allis-Chalmers Co. for six McDougall furnaces, to be installed in the Salt Lake City plant. The furnaces are of the standard Klepetko-McDougall type, with all the latest improvements in details. The furnaces are 18 ft., outside diameter, and have six superimposed hearths each.

The DeRemer Water Wheel Co., of Denver, Colorado, reports closing contracts for water power installations as follows: High Creek Electric Light & Power Co., Richmond, Utah, two 400-h.p. DeRemer water-wheels with governor regulation; Marguerite Mining, Milling & Leasing Co., San Luis Valley, Colorado, one 100-h.p. DeRemer water-wheel; Bourne Gold Mining Co., Bourne, Idaho, to equip a 11-ft. 6-in. foreign wheel with twenty-four 18-in. DeRemer water-wheel buckets.

The annual meeting of the Globe Express Co. was held Oct. 16 in the office of the Denver & Rio Grande railroad, Denver, and the following directors were elected for the ensuing year: George J. Gould, E. T. Jeffery, C. H. Schlacks, Jesse White, J. W. Gilluly, J. F. Vaile and J. B. Andrews. It is announced that the company has signed contracts with the new Western Pacific, whereby it will have the exclusive franchise to operate over that road. It will also succeed the Wells Fargo Co. on the Rio Grande Western as soon as the latter's contract expires.

A feature of the annual meeting of the Dominion Iron & Steel Co. was announcement of retirement of Frederick Nichols, vice-president, who went into office at the time when the company was practically bankrupt and who has since devoted his energies to the work without remuneration. J. H. Plummer, president, in an address stated that in the past four months the company has earned $292,000 and that interest charges were $224,000, leaving $68,000, which might be applied to paying off preferred stockholders. He stated that the company would soon be in a position to roll from 800 to 1,000 tons of rails every 24 hours, and that work was being carried on at a fair profit.

S. G. Cooper has been elected president of the Republic Iron & Steel Co., succeeding A. W. Thompson. C. S. Guthrie has been elected chairman of the board and executive committee. The directors reorganized the executive committee by electing the following: C. S. Guthrie, S. G. Cooper, Grant B. Schley, John W. Gates, L. C. Hanna. All officers, except President Thompson, were re-elected. S. G. Cooper, the new president, was years ago connected with the Illinois Steel Co., later with Naylor & Co., iron merchants, and still more recently at the head of Banning, Cooper & Co., iron dealers of Pittsburg. He is an experienced man in the iron business. C. S. Guthrie, the chairman of the board and executive committee, was president of the American Steel Hoop Co. before it was absorbed.

Construction News.

Uniontown, Pennsylvania.—The Henry W. Oliver estate will soon take up the erection of a 400-oven coke plant adjoining the Thaw property at Oliver.

Pittsburg, Pennsylvania.—The Luster Mining Co. is contemplating the installation of additional machinery at its mines in Mexico, to bring its daily output up to 2,000 tons.

Tonopah, Nevada.—The Ohio Tonopah Co. expects to let contract for a 40-stamp mill. It has at present a 10-stamp mill at the Logan mine. The new mill will be operated by electricity.

Black Bear, Siskiyou County, California.—The Black Bear Mining Co. will add to its equipment additional stamps, concentrator and other machinery. John Daggett, of San Francisco, is president.

Gaffney, South Carolina.—It is reported that L. U. Campbell, of Gaffney, has purchased from the Carolina Tin Co., Charlottesville, Va., the Jones tin mine, which will be extensively improved and operated.

Joplin, Missouri.—The Bumblebee Mining Co., operating on the Shewmaker land southeast of this place, has nearly completed the erection of its new concentrating plant. Additional milling machinery will probably be installed.

Carthage, Missouri.—It is reported that the Grier Mining Co., which operates south of this place, will instal a new pumping plant and drain its mines to a greater depth. This is, however, conditional on a sale of a portion of its lease, an option for which has already been secured.

Pottsville, Pennsylvania.—The Philadelphia & Reading Coal & Iron Co. has decided to pump the water from several of its abandoned mines, near here, in order to operate the New Castle shaft into which some of these old workings at present drain. The Thomaston colliery is also to be re-opened.

Sydney, Cape Breton, Nova Scotia.—The Canadian Westinghouse Co. has closed a contract with the Dominion Coal Co. for the installation of an extensive electrical plant at No. 2 colliery near Sydney, N. S. It will operate the pumps and fans of the mines in the neighborhood and also provide surface light.

Dawson Springs, Kentucky.—The Dawson Coal, Coke & Railway Co. is preparing to develop coal land near Dawson Springs, and is having preliminary surveys made of the tract, and will arrange at once for equipping and operating the plant. W. G. Harris is in charge of the work. It is also proposed to build a number of coke-ovens.

Meriden, West Virginia.—The Philippi Collieries Co. will operate properties consisting of about 6,000 acres of coal land, a modern mining plant, including electric haulage and having a capacity of 4,000 tons daily and a tipple capacity of 2,500 tons. An additional tipple will be erected. The company has a capital stock of $600,000.

Uniontown, Pennsylvania.—E. D. Fulton, and W. W. Parshall, of this place, acting for the McKeefrey Coal Co., expect to build 68 new coke-ovens on the plant of the Geneva Coke Co., near Masontown. P. E. Crow is understood to retain his position as superintendent. The property was sold to the new company on Oct. 18 last for $465,000.

Escanaba, Michigan.—The Chicago, Milwaukee & St. Paul Co. is to build this winter, at its own shops, 300 wooden ore cars, hopper bottom, steel underframing, 22 ft. long, to carry 48 gross tons each. All will be equipped with M. C. B. couplers and air brakes. This road has begun the dredging for a large ore-shiping dock, to be 1,200 ft. long, 70 ft. high and 56 ft. wide. It will have 50,000 tons storage capacity, and will double the road's annual capacity for shipment.

Duluth, Minnesota.—The Duluth, Missabe & Northern road is to construct a fourth iron-ore shipping dock this winter, to be ready for the opening of navigation next spring. It is to be 2,400 ft. long, with pockets on either side, giving it half a mile of loading frontage. It is to be about 70 ft. high above water, and will have storage capacity for 80,000 tons, making it the largest ore pier in the world. It is to cost about $650,000. The road now has at Duluth shipping docks with a total available length for loading vessels of about 10,000 feet.

Uniontown, Pennsylvania.—A railroad 80 miles in length, operating between this place and Wheeling, W. Va., is projected by the capitalists interested in the Uniontown & Wheeling Short Line railroad, and the Connellsville & Pittsburg Coal & Coke Co. The road will open and tap more than 100,000 acres of coal land in Greene county. The expenditure required is estimated at about $20,000,000. J. V. Thompson, of Uniontown; D. F. Maroney, formerly superintendent of the Pittsburg Division of the Baltimore & Ohio, and other prominent men are interested in the deal.

Huntingdon, West Virginia.—The W. G. Wilkins Co., of Pittsburg, Pa., is preparing plans for the Guyan Valley Fuel Co., for improvements in handling the product of this company's two mines. The coal will be hauled in the company's own cars over the Chesapeake & Ohio railroad to Huntingdon, where it will be loaded by a river tipple into a fleet of barges and transported by river to a point 16 miles below Cincinnati. The most extensive works will be erected at this place. Storage tracks will be built here by the company, and 100 fifty-ton steel hoppers and a large number of barges and towboats will be required. E. P. Merrill, of Holden, W. Va., is president and W. H. Coolidge, of Boston, Mass., is secretary and treasurer.

Special Correspondence.

San Francisco. Oct. 24.

State Mineralogist Aubury is now investigating some alleged mining companies in Los Angeles, which have been making remarkable assertions in their advertisements.

J. T. Quinn, of Fair Oaks, and J. L. Conrad, of Knights Ferry, have nearly completed all their preliminary arrangements to dredge the Stanislaus river for gold between Orange Blossom and Knights Ferry, Stanislaus county. Some of the machinery is on the ground, so that it will be but a short time before operations are commenced. Near Folsom, in Sacramento county, a company headed by S. C. Laird, of Berkeley, is about to mine the Landis property which adjoins the Orangevale road on the east. They are to work the ground by hydraulic elevator, and water will be brought in from Fern Glen. None of the projects previously tried in this area of ground have been made to pay, but the people who now begin are confident of success with the hydraulic elevator system.

The town of Marysville, which is the principal one in Yuba county, is making an effort to have the Yuba Gold Fields Co. establish its proposed extensive repair shops there instead of at the new dredging town of Hammon. The dredging company will eventually have eight or ten dredges at work along the Yuba river and the machine shops attendant on the industry will be large ones. The shops are expected to give work to about fifty skilled mechanics, in addition to the usual laborers. The people in that section expect these new shops to be so equipped as to construct an entire gold dredger as well as to make repairs to those already built.

The report to the Sutter County Board of Supervisors by Engineer W. F. Peck, concerning the situation in the dredge mining field below Oroville, does not seem to satisfy that body. In brief, Engineer Peck declares that of all the boats operating in this district only four are doing harm to the river, and it is reasonable to assume from the fact he does not dilate upon the amount of harm being done, contenting himself with a mere statement that the four dredges in question discharged débris into the stream, that he does not consider them much of a menace. Hardly any other conclusion could have been reached by any unprejudiced and honest engineer. There are only four machines operating in the river proper and the men handling them are taking measures to suit the conditions, not having any desire to injure valley lands with any material they may stir up from the river bed. The Sutter county people evidently desired some kind of a report which would give them cause to proceed with suits against the dredge men.

At San Andreas, Calaveras county, the jury in the case of the People vs. W. T. Mitchell and Fred Sciaroni brought in a verdict of guilty as charged. This is the case in which the defendants were charged with blowing up and injuring with dynamite the Angels quartz mine, owned by James V. Coleman, at Angels Camp. The defendants were the foreman and shift boss of the mine, and learning that the foreman was to be discharged and a new foreman substituted they, out of spite, destroyed portions of the mine on May 31 last with dynamite.

The Copper King mine at Clovis, Fresno county, under leave from the court, is shipping 100 tons of ore a day, with an average value of $20 a ton. This is sent to Tacoma for smelting and the debts of the old company are fast being paid.

At Weaverville, Trinity county, the lawsuit over the Globe quartz mine at Dedrick, Cañon Creek district, has been compromised on terms known only to those interested. The Globe mine was sold by its locator, Robt. Woodburn, to H. M. Hall and H. Duvergey, in 1899, for $25,000, the cash being paid. Woodburn was almost a helpless cripple, and was also rather weak mentally. Inside of two weeks after the sale he brought suit to recover the property, alleging that he had been unduly and fraudulently influenced to sign the deed. It was alleged that $25,000 was an inadequate price, for Woodburn had been repeatedly offered $150,000 for the claim. The suit was thrown out of court because Woodburn, through his attorney, refused to deposit $25,000 pending the trial. An appeal was taken to the Supreme Court, which favored Woodburn, sending the case back for trial. Woodburn died in the meanwhile, but his estate kept up the fight.

The product of the new Mammoth smelter at Kennett, Shasta county, in the form of a matte of about 40% grade copper, will be shipped to the smelting plant of the United States Mining & Smelting Co., at Murray, Utah, a related company. Over 2,000 tons of silicious ores have been received at the smelter, which represents the present reserve capacity for that character of ore. All shipments are being taken care of, in temporary quarters.

Two companies have begun to mine for diamonds in this State. One of them will work at White Rock hill, two miles northeast of Placerville, El Dorado county, where some stones have been found in times past. The other will try its luck at Cherokee, Butte county. In the past 20 years over sixty diamonds have been found in the Cherokee mine, the most valuable one having been placed at $1,200, but most of them ran in value from $20 to $100. Most of the stones are of a light-yellow tinge, although a few pure white ones have been found.

The Oakland Development Co. has a force of men at work drifting on the Mameluke Hill gold mine.

Paradise, Ariz. Oct. 16.

The Paradise district in the Chiricahua mountains is continuing its rapid development. At the eastern end of the district, the first active property encountered is the Savage Gold & Copper Co. In the main tunnel work is progressing at the rate of about 3 ft. per day, with two shifts, the breast still being in ore, which has been continuous from entry. The winze, which is being sunk about 250 ft. from entry, is down about 30 ft. and has encountered the sulphides. In the main shaft, sinking continues in the hanging wall of the ledge, which shows good ore. As soon as the smelter is finished, stripping ore will begin. The company is employing a force of 15 men, which will be increased to 25 soon.

Just west of the Savage is the Cochise Consolidated Copper Co. At this property work continues, with about 15 men. The shaft is nearing the 200-ft. level, and when this level is reached the company contemplates cutting a station and driving a crosscut through the formation. The lumber for the concentrator building has arrived, and work on its erection will begin at once. Harry Alexander, the manager, has just returned from a three weeks' trip to Pittsburg, the headquarters of the company.

The Chiricahua Development Co. has recently increased the force 15 men, making about 60 in all.

At the Manhattan Development Co., work is being pushed at both ends of the property. The adit tunnel at the eastern side is in about 450 ft., and in this distance it has cut five ledges, all carrying iron ore, and two of the ledges contain a small percentage of copper. This crosscut tunnel was driven to cut the contact at a depth of about 300 ft., and they still have about 300 ft. to go to reach the ledge. On the west side of this property another adit was put in the hill, and drifting on the ledge from this tunnel continues in good ore.

At the Colvin-Badger group, the owners are having the claims surveyed and contemplate starting an adit, as soon as the survey is finished, to get under an immense iron and copper outcrop on the surface. The tunnel will cut this body of ore at about 300-ft. depth.

Bisbee. Oct. 24.

The Copper Queen Mining Co. is increasing its product rapidly. Within the past 60 days its ore shipments have increased 50%, and are still growing. This has resulted in a shortage of cars for hauling ores from this city to the furnaces. The El Paso & Southwestern road will soon order a lot of additional 50-ton hopper-bottom, steel ore cars, and will be in shape to handle the extra traffic that is coming to it. This is not only from the Copper Queen, but from the Calumet group, which has started up one additional smelter and will shortly start another.

The two furnaces at the Calumet smelter, which have been running on Calumet & Arizona ore, have made some phenomenal records the past few days, and are now making from 125,000 to 139,000 lb. of blister copper daily. Their average rate of production has been about 85,000 lb. per day. The jump is probably due not only to pushing the furnaces themelves, but to certain richer orebodies that have recently been encountered. No ore from the Senator claims has yet gone through the smelters; so nothing from there can have increased the production. The Oliver shaft, which is the avenue of production of these claims, is now beginning to hoist, and has been working only three or four days; probably none of its ore has reached the smelter bins. The month's output will not be largely increased above the average of 2,650,000 lb., though it might be.

The Hoatson shaft of Calumet & Pittsburg mine is going down at the rate of 35 to 40 ft. per week, and the management expects it will make at least 145 ft. this month. The miners working in the shaft have been promised a bonus if they make 150 ft. This will be the best work ever done in the district. The shaft is going down in a compact limestone. It is now 528 ft. deep, and is booked for a depth double that before resting. At this mine a new 1,500-gal. Prescot triple pump has been placed at the 910-ft. level as a safeguard in case one of those in the main station breaks down or needs incidental repairs.

At the Junction mine the miners have completed the cutting out of the main shaft to a full five compartment clear to the surface, and are now installing a 12-in. steam and two 8-in. water columns to surface. The "run-around" drift surrounding the shaft on the 900-ft. level is about completed, and long drifts will be started from the 1,000-ft. level, running south and so along the contact lines.

Congdon shaft, of the Duluth mine, which has been closed all summer, is to be re-opened at once and will serve as the avenue from which all ore from the 1,250-ft. level of this mine will be hoisted, until such time as the Cole shaft of the Lake Superior mine is equipped with a new steel headframe, now under way. This steel headworks will take the place of a wooden shaft-house now on the ground. Hoisting from the Cole shaft will be by the wood frame while the other is built around it; but the difficulty of work will cut down the capacity of the shaft, and Congdon shaft is needed to help out. On the 1,250-ft. level of Duluth mine a diamond drill is steadily employed, testing for new ore lenses, and for the past week it has been constantly in ore. This runs from as high as 15.5% down, and is all sulphide, running very high in sulphur. North drift, 1,100-ft. level, of Lake Su-

perior mine, is now 600 ft. out from the Cole shaft, and has passed through the large body of high-grade ore encountered two weeks ago. It is now driving to get under the enormous body of leached ore found on the 1,000, where there was a length of more than 700 ft. of leached material, giving much promise for greater depth.

Calumet & Arizona, in the crosscuts 117, 118 and 119, on the 1,150-ft. level, Senator claims, is all in ore, the best 16% copper and the poorest about 7%. These developments are very important and promising. The mine is showing up more and more mineral.

Copper Buttes mine, in the Silver King district, north of Kelvin, is now optioned to Martin Pattison and others, of Duluth, Minn., who are the owners of the Shattuck and Denn here. Mr. Pattison has been looking over the ground, and will probably explore the mine. It has a shaft 500 ft. deep and several shallower, one of which is 175 ft. deep in rich black oxide of copper. It is a great volcanic outburst, and may develop into a fine property. The stock of the company is owned in Minneapolis, Minn., and at Phœnix. It is stocked for $6,000,000, but the purchase price is at a great discount.

No. 4 furnace of the Calumet & Arizona is now running up to its capacity of 300 tons a day, of which 200 tons comes from the Lake Superior and the rest from the Duluth.

Finds on the 350-ft. level of Saginaw have been developed, so that there is a width of carbonate ore of 7 ft. and a length of about 40 ft. This is making the mine look very well. Drifts will be run on the lower levels as soon as machinery is in place and the pumping capacity is deemed sufficient for any possible requirements.

Tonopah. Oct. 27.

Local mining men are giving a good deal of attention to the Lone Mountain and Silver Peak districts. In the former district, the Nevada-Alpine Co. has struck a large body of silver-lead ore of high grade. Good lead ore is also being raised in the Argenta.

At Silver Peak, the Mohawk-Alpine Co. has cut a vein 2 ft. in width, in the lower tunnel, in the Homestake mine. The ore is free-milling gold and averages $80 per ton. The company is working a small 5-stamp battery, and as the result of 12 days' milling recently cleaned up for a return of $6,000 gold.

A few weeks ago the American Smelting & Refming Co.'s smelter at Salt Lake City placed what was practically an embargo on Tonopah ores by refusing to accept more than a stated amount of ore from each mine every week. As a result, one of the three dividend-paying companies, the Montana Tonopah Co., was compelled to pass its quarterly dividend.

The reason which led the American Smelting & Refining Co. to take this drastic action, apart from the crowded condition of its smelter, was the fact that Tonopah ores contain so large a percentage of silicates that it requires oftentimes an almost equal weight of fluxes to reduce them, and these fluxes are at times difficult to obtain. The American Smelting Co. is working on the Tonopah ore question at the present time, and is putting in additional capacity sufficient to handle Tonopah, Bullfrog and Goldfield ores. There is every reason to expect that within 60 to 90 days the situation will be considerably relieved and the Tonopah companies will be allowed to ship a larger quantity of ore to the smelter.

In view of the above situation the report that Charles M. Schwab contemplates building a smelter near Tonopah for the reduction of Tonopah ores, acquired considerable importance.

The American Smelting & Refining Co. is said to be earning $2,000,000 net per annum from the treatment of the Tonopah-Goldfield ores and to be producing more gold from its Salt Lake plant than from all its other smelters put together.

Butte. Oct. 23.

This district has another mining company known as the East Butte. It was organized last week, under the laws of Arizona, with a capitalization of $3,000,000 in shares of $10 each, the incorporators being J. H. Talbot, T. M. Hodgens and C. R. Leonard, the two first named being Butte bankers and the latter an attorney. The company intends to operate in the Eastern part of the city. It has taken over the Oneida, Lassen, Yankee Boy, property of the Geyman Mining Co. and the Dutton mine, the latter owned by the Butte Mining & Smelting Co., and is negotiating for other claims. The Geyman includes a 250-ton concentrator. All of these mines have been worked in a desultory way during the last two years, and have yielded good copper-silver ore. Several shipments have been made from the Dutton this month.

Pittsburg & Montana Copper Co. is operating its plant full blast and is making about 6 tons of copper per day. It has two carloads ready for shipment. Its new blower is working well. The company is increasing its output of ore, which is made possible by the widening of the two principal veins on which drifting west from the 1,200 crosscut is in progress. The ore averages 7% copper and from 12 to 15 oz. silver. The farther west the drifts are carried the better the ore and wider the veins. Since the resumption of the converters, about 300 tons of low-grade matte, accumulated while the blower was being installed, have been treated along with the crude ore.

United Copper is contemplating additions to its smelter. It purposes to instal furnaces for making a low-grade matte and treating crude ore without water concentration, thus utilizing part of the Baggaley process. It is also figuring on a method of treating the ore of the Lexington, which contains copper, silver, lead, zinc and iron. The percentage of zinc is quite heavy. The Montana Zinc is treating between 80 and 100 tons of this ore per day. It retains the zinc and returns the copper and iron to Heinze.

North Butte is mining only its best ore, and is not raising waste. This is necessary, because the output is being hoisted through the shaft of the High Ore. The main shaft of North Butte is still in the hands of the timbering crew and will not be ready for use for at least a month. The daily extraction is between 500 and 600 tons.

Amalgamated will have its hoisting engine on the Diamond in working order next week and the old output of 800 tons per day will be resumed. All of its other mines are in full blast, yielding a total of 10,000 tons per day. The new engine on the Mountain View, one of the heavy producers of Boston & Montana, is ready for work.

The Original Co., controlled by Senator Clark, is mining and treating 1,000 tons of ore per day. It has finished sinking its main shafts and is now crosscutting for the veins at a depth of 1,900 and 2,000 ft. from the surface.

Another new company is being organized to open the veins of the Smokehouse, Detroying Angel, Thomas and Arctic claims, which traverse the heart of the city. Options on all of these claims save the Arctic have been secured.

Leadville. Oct. 18.

Patrick Mulrooney and associates, working a mine on the Continental Chief, at the head of Iowa gulch, a mine situated above timber line, a few days ago struck a body of ore that runs $300 silver per ton; the vein is of good proportions and is widening out as work proceeds.

George F. Barry has secured a lease on the Rattling Jack, lying south of the Little Jonny, and has started to improve the surface workings. When this is done the shaft will be sunk another lift of 450 ft. Mr. Barry has also secured a lease on the Elk ground adjoining the Rattling Jack. The two properties will be worked together.

The Forest City, South Evans, is shipping about a carload of good-grade ore daily from the Cary shaft. In another shaft on the property, to the north, a good body of ore has been opened at the 150-ft. level, and from it considerable ore is expected to be shipped.

In addition to the work already being carried on in Adelaide park, the old Adelaide shaft is being deepened by Andy Dyatt and prospecting at the 300-ft. level

north is proceeding. At the southern end of the claim good ore, carrying gold, silver and copper, is being hoisted. In one of the lower levels of the Flagstaff, a good body of lead carbonate ore has been reached, and shipments have started. It is stated that the ore runs 60 oz. silver per ton in addition to the lead contents. This is probably the extension of the old Mikado ore-shoot. The ore recently opened in the Evelyn shaft at the 900-ft. level is dipping down, and development work is necessarily slow, as the shaft is 1,200 ft. deep; the company will probably unwater it and work from the bottom to catch the ore on its dip. From the 370-ft. level the Humboldt is shipping a little better than 200 tons a month of good ore. The old Park shaft is hoisting considerable iron of good grade, and when the ground is opened more extensively, shipments will increase.

There is a noticeable revival of mining on Breece hill, and from the different properties a fair tonnage of ore is being sent out monthly. The Garbutt has increased its shipments; the Spot Cash has opened a body of ore in one of the lower levels; the Ballard is shipping a little better than 1,000 tons per month; the President, adjoining the Ballard, is doing development work; the Bertha is shipping 25 tons daily of silicious ore; the Triumph-Inez is doing prospecting work; and The Silver Nugget is getting in shape to start sinking.

Salt Lake City. Oct. 24.

A force of almost 500 men is employed on the work of constructing the new copper smelter of the American Smelting & Refining Co., at Garfield, 18 miles west of Salt Lake City. The plant, when completed, will cover almost 30 acres of ground and the cost will probably exceed $2,250,000. The initial units, of 2,000 tons daily capacity, it is expected, will be ready to go into commission by April 1, 1906. Ultimately, the plant will have such units added that it can reduce 5,000 tons of ore per day.

The buildings will be constructed of steel, brick and concrete. Two sampling mills will be put in, equipped for the testing of every grade and variety of ore. Special devices will be installed for the purification of smoke. The smoke-stack will be one of the largest in the world. It will be 300 ft. high, the outside measurement at the base will be 42 ft., while the inside will be 30 ft. Karl Eilers, a member of the executive commmittee, is the chief consulting engineer; C. S. Foght, is engineer in charge; R. W. Watson, superintendent of construction.

General Manager Charles W. Whitley has announced the appointment of B. H. Bennetts as superintendent of smelter, and Mr. Knight, as assistant superintendent.

The Mt. Nebo Mining Co. and H. M. Shart have been made defendants in a suit instituted by Marie Larsen Anderson, who asks the Court to restore to her money which she claims to have invested in stock of the company, on representations made that have since turned out to be false.

The Ontario Mining Co., at Park City, which has been working to clear its drain tunnel of the caves which obstructed it last March, is no nearer a solution than it was three months ago. After drifting for 125 ft., around what was supposed to be the last cave, from a point in the tunnel 14,000 ft. in, the work has had to be abandoned on account of swelling ground. The water in the Ontario mine continues to rise, but so far the Daly West or other adjoining properties have not been affected.

The statement of the Daly West Mining Co., covering the month of September, shows receipts from all sources to the amount of $95,279. The disbursements were $51,716, leaving net earnings of $43,563. After setting aside $36,000 to the dividend account, $7,563 was turned into the surplus.

Duluth. Oct. 27.

Shipments from Minnesota will be reduced rapidly after the first of November, and those from the eastern part of the Lake region will remain heavy to the middle of December. Already two nights of frost to 20° and 22° above zero have checked ore so that it has run out of upper lake cars and docks very slowly. The open-pit mines are nearly through and many of the smaller underground have ceased for the year. Stock-pile grounds are being leveled off and made ready for the coming winter, and the preparations point to a greater business than ever.

The Great Northern road has recently closed up on a number of western Mesabi options that it has been exploring, and has paid out several hundred thousand dollars the past few weeks for ores in the ground.

Arrangements are being made for the removal of the village of Sparta, on the central Mesabi, on account of the large body of iron ore found beneath it by the Oliver Iron Mining Co., which has the lease of the ground. The village will either be located at the Pettit mine, a short distance east, or be incorporated with the city of Eveleth, a few miles west. The original owners of the land will move all buildings at their own expense, and will provide water, sewers and streets in the new location, giving lots equivalent to those abandoned at Sparta. This was the course adopted by the same people when they found ore under the original site of Eveleth, and were obliged to move that place.

Several small mines on the Menominee and Gogebic ranges have ceased shipments for the year. Among these are the Breen, at Waucedah, which was a new mine this year and made a product of 25,000 tons. It is to increase its openings underground. Monroe mine at Norway, is over for the year, with 92,000 tons to its credit. Vivian mine is through, with 75,000 tons. Baltic mine is about over for the year, after shipment of 200,000 tons.

Steam shovels are working in the large stock piles of the Chapin mine, and they will be cleaned up by the close of navigation. There is still a great deal of ore in these piles. The mine is quite likely to increase its force of men to 1,000 in a short time.

Reports of mine inspectors of Marquette and Dickinson counties have been made. They cover the year to Oct. 1, 1905. In Marquette there are 26 operating mines and four others that are classed as active, though not hoisting. There have been three resumptions in the past month and three have closed during the same time. For the year 4.35 men were killed in mines for each 1,000 employed. In all 5,060 men were employed. In Dickinson county the number of mines active was 20, the men employed numbered 3,212, and the fatal accidents 9, or 2.8 per 1,000. This county has always made a good record for careful mining. Only four of the deaths were due to falling ground. Mines of the county produced in the 12 months 2,613,000 tons of ore. This is one of three counties covered by the Menominee range, the others being Iron and Florence, the latter in Wisconsin and containing a few mines.

Calumet. Oct. 28.

At no time since the inception of active mining operations in the Lake Superior copper district have there been so many men employed in the mines as at the present time. According to the annual report of Mine Inspector Hall, the average number of men employed in the mines of Houghton county during the year ended Sept. 30 was 15,225. Houghton county is the scene of the principal activities and the mines employed nearly a thousand more men that in the previous year, which was a record-breaker. It will be noted that 15,225 men constituted the average working force for the year. As a matter of fact, the number of men employed at the present time is much greater, probably 16,000, owing to the enlarged scale of operations during the last six months.

In Ontonagon county the average number of men employed in the mines was 1,100, according to the annual report of Mine Inspector Chynoweth. This is an increase of 266 over the previous year. There are five active mines in that county and larger working forces will be employed during the coming year. In Keweenaw county the Mohawk, Ahmeek and Allouez are the largest mines and the only producing properties at the present time. There is a large amount of new work in progress, however, extensive exploratory operations being conducted by various interests.

Notwithstanding that the present force of the Lake Superior copper mines is the

largest on record, there is urgent need for additional men. There is a scarcity of experienced miners, and even ordinary laborers are not plentiful. The reopening of the Osceola amygdaloid mine of the Calumet & Hecla Mining Co. has furnished employment for hundreds of men and this company is short of experienced men for its new workings on the Delaware property in Keweenaw county. Many of the older companies are showing more activity and greater numbers of men are employed as the result.

Probably more than 18,500 men are now given employment in the mines, stamp mills and smelting plants of the Lake Superior copper district. In addition there are several thousand men employed in the sawmills, machine shops, foundries, etc., all of which are dependent to a greater or less extent upon the copper-mining industry.

It is stated that the Osceola Consolidated Mining Co. has recently opened some very rich ground in its South Kearsarge mine. There are two shafts on this property, and both are bottomed at a depth sufficient to bring them into the shoot of rich copper values raking southward from the Wolverine mine.

Rock shipments from No. 1 shaft of the Osceola Consolidated Co.'s North Kearsarge property were resumed this week after an idleness of several days. Hoisting was discontinued owing to an accident which demolished the top of the rock house and damaged the shaft. It is not likely that the production of the Osceola company for the present month will show any decreases, however, as shipments from the other shafts were increased during the interim.

Drifting northward upon a lode which was encountered in a crosscut driven westward from the shaft is under way at the Mayflower property. The lode is located at a point 1,000 ft. from the shaft, but has shown no copper as yet. Later it will be opened by a drift driven on its course in a southerly direction. After the investigation of this lode shall have been completed, the crosscut will be driven 175 ft. further to intercept an amygdaloid located during the diamond drill explorations a few years ago.

Sinking in the shaft on the Old Colony property has reached a depth of 700 ft. Although the lode in which the shaft is opened possesses a healthy and fairly encouraging appearance, there is no copper at the present depth. The Old Colony carried on exhaustive tests of the various beds traversing its property at a depth of 580 ft. and the shaft is being sunk to permit lateral explorations at greater depth. The point at which this work will be started depends largely upon the showing of the lode in which the shaft is sinking, but it is not likely to be above the 1,000-ft. level.

Platteville, Wis. Oct. 28.

Mining operations continue active. The organization of 12 new companies is reported during the last week. Prominent among these is the Glanville mine, located at Linden, Wis. The mine on this company's land has been in operation for a great number of years and has always been a large producer. It is the intention of the new organization to instal power drills and other necessary machinery to operate the mine in a more profitable manner.

The Linden camp will exceed all other camps in production, as soon as the several recent strikes are producing. Since the recent strike on the Plattville-Linden Mining Co.'s property, about two miles west of Linden, owners are being offered $1,000 per share on a $50 investment. They have struck very rich drillings, assaying 20% metallic zinc and lead, and have found ore in six out of seven holes.

A new sheet of jack is reported as having been struck on the old Mason property now controlled by the Mineral Point Zinc Company.

The Tripoli Mining Co., in the Mineral Point camp, consisting of Milwaukee capitalists—A. W. Hill, president; E. C. True, secretary—is turning out ore at the rate of two tons per hour. Owing to a breakdown in the roaster plant, it was compelled to sell several carloads of unroasted ore to the Mineral Point Zinc Co., as their bins were all full and they had no storage room. The Tripoli has 80 acres under lease at one-eighth royalty, with eight shafts now down to the 100-ft. level, at which point the main vein is found.

Considerable attention is being paid to the mining lands lying between Highland and Cobb, a number of eastern parties having recently obtained leases in this locality.

Oscar A. Rogers, of Pittsburg, Pa., is looking up mining properties for himself and associates. They have obtained two pieces of property said to be very valuable.

There have been 105 prospect drills in operation during the last year in the entire district; 35 of them have been operating within a radius of 5 miles of Platteville. The proportion of holes found containing ore runs high, in the neighborhood of 80%, but of these only about one-half can be said to have enough showing to warrant the sinking of shafts. A number of the drills are making preparations to continue work during the coming winter.

The Mills Mining & Reduction Co., in the Hazel Green camp, has just let a contract for a roaster and magnetic separating plant. It is the intention of the company to begin the erection of its new 300-ton concentrating plant at once. It is the intention also to instal a large compressor plant.

An important feature in connection with the ore found in this property is that the core lying between the two pitches is rich.

Scranton. Oct. 30.

Another big coal deal has been consummated by the Schuylkill Coal & Iron Co., which has purchased 357 acres of coal land in Branch township, Schuylkill county, from the heirs of J. J. Albright, formerly of Scranton. The tract was known as the Tyson & Kendrick property, and for many years no coal has been mined on the tract. In 1887 it was purchased by J. J. Albright, whose heirs have just sold their interests. It is an important deal, for the reason that the coal lands of Calvin Pardee and the Lehigh Valley Coal Co. adjoin the property.

Extensive operations are being instituted by the Philadelphia & Reading Railroad in connection with the strippings at Ellangowan, near Mahanoy City. A deep cut has been made through the mountain in order to carry the coal to the Ellangowan breaker.

The miners and boys on strike at the Jeddo collieries of Markle Brothers have returned to work, the trouble to be submitted to the Conciliation Board, which met at Pottsville on Monday. The boy who was the cause of the trouble will not be reinstated until the decision of the board is known.

But a few years ago the old-time operators would have smiled at the suggestion of working some of the small veins of anthracite which were classed as unworkable. Some of these were abandoned many years ago as hopelessly unprofitable. They are now being opened up, the most striking case of recent date being the operations of the Lehigh Coal & Navigation Co., at Bear Ridge, where some workings were abandoned 55 years ago. Two tunnels are being cleared out, and at the face of the lower tunnel a fine vein of coal has been found. A large shaft is to be sunk, and the development will benefit the entire Schuylkill valley from Tuscarora to Pottsville.

Almost all the coal-carrying companies are complaining of a shortage of cars, some of the collieries working but two or three days a week for this reason. Fire has broken out in the workings of the Girard Mammoth colliery, at Raven Run. Strenuous efforts are being made by the Reading company to extinguish the flames.

Cain brothers, of Pottsville, have opened a new vein at Heckscherville valley, and will erect a breaker there. The tract is said to have coal which has practically been untouched. The coal will be shipped over the Philadelphia & Reading railroad.

William M. Stein, the veteran mine inspector of the Shenandoah district, was recently presented with a gold watch and chain, valued at $500, at a farewell banquet at which 300 were present, to mark his retirement from actual service. The presentation was made by Manager W. J. Richards, of the Reading.

Owing to a peculiar disease which has taken a strong hold of the mules at a number of collieries in the Shamokin

neighborhood, work had to be suspended. The disease has baffled the skill of the veterinarians so far, and a number of valuable mules have died. An epidemic, apparently the same, spread through the region about 20 years ago.

President Truesdale, of the Lackawanna, paid his first visit to the coal department of the company last week, since his return from Europe. The mammoth Truesdale breaker is now ready for operation, and the president started the machinery for the first time and threw the first shovelful of coal into the rolls. The lumps which were thus the first to be crushed in the breaker were kept as souvenirs of the occasion. Actual work was begun in the breaker on Wednesday. It will be three or four years before the breaker can be worked to its full capacity, as the shaft being new, it has not been sufficiently developed to mine enough coal to keep the immense breaker in full operation. As explained in THE ENGINEERING AND MINING JOURNAL recently, it has been built in duplicate, so that one side can be operated independently of the other. Until the mine is thoroughly developed, the two sections of the breaker will be worked alternately. Quite a large amount of coal will, however, be handled immediately, as the workings will include two slopes where a large number of miners are already at work. The officials expect that the breaker will easily be capable of crushing 6,000 tons a day.

The Lehigh Valley Co. will take over the Coxe Brothers collieries on Nov. 1, but so far no changes have been reported, and it is stated that none of any importance will be announced until the new year. It is probable that the Lehigh will make a separate mining district of the Coxe operations, that W. H. Davis will continue superintendent of the Hazleton division, and that one of the present Coxe officials will be appointed chief of those properties. All the Coxe railroad equipments will be used, but shipments of coal from some of the breakers will be sent by a more direct route than heretofore.

There were 20,000 mine workers in the parade on Saturday in Scranton in celebration of Mitchell day, the miners' leader being the guest of honor. It was the largest parade ever seen in that city. Excellent order was maintained. In the evening President John Mitchell was the guest of honor at a banquet which was attended by a delegate from each local in district No. 1. It was expected that Mr. Mitchell would make some specific announcement in connection with the termination of the agreement in April next, but in this his hearers were disappointed, as Mr. Mitchell did not depart from the lines which he followed during his tour of the anthracite region. He urged that each local should continue to do its best to increase the membership by April, so that they will be all the stronger to meet the operators. It was observed that his tone was conciliatory throughout.

An important rule has been made by the Lehigh Valley Coal Co. requiring that all miners stay in their chambers until their laborers are ready to leave. As the Lehigh company is one of the strongest in the anthracite fields it will be interesting to observe the result of the order. The mine workers are now asking for an eight-hour day. The miners work on an average about four hours a day. They pull down sufficient coal for their laborers to load during the day and then return to their homes. If the order be enforced the miners will be compelled to work nine hours daily, or assist their laborers to load their coal, and leave with the laborer as soon as the necessary number of cars are loaded. The miners have already expressed great dissatisfaction at the order, and state that they will not obey it. The management declares that it will insist upon the order being obeyed, claiming that the large number of fatalities by fall of roofs is due to the lack of skill upon the part of the laborer after the miner has left him in charge of the chamber. Recently a coroner's jury, in connection with a fatality of this kind at the Bliss colliery of the Lackawanna company, censured the miner who had left the laborer in charge of the chamber and recommended that miners be required to remain until the laborer was also ready to leave. Even if the laborer were granted an eight-hour day, this would not compel the miner to remain that length of time. He contends that he is only required to bring down the coal and that his duties then cease. The company contends that he is responsible for the chamber the entire day and for the life of his laborer while he is working below. The order was not posted until Saturday.

The anthracite mine workers will hold a joint conference in Shamokin on Dec. 14 to consider the demands to be made in April.

Toronto. Oct. 26.

There is renewed activity in gold mining in the Lake Manitou area, Rainy river district. The Big Master mine, Wm. Shovell, manager, recently cleared up 140 oz. of gold from 450 tons of ore after a 23 days' run at their 10-stamp mill. The shaft is down 285 ft. and a force of about 30 men is employed. They expect to run night and day for some time and anticipate no difficulty in getting a steady supply of ore. Should conditions continue as favorable as at present the company intends installing a cyanide plant. The Gold Rock Mining & Milling Co.'s property in the same area was recently visited by Director J. E. Pixley and Assistant Secretary Dr. J. W. Hyatt, both of Columbus, Ohio. The shaft has reached a depth of 127 ft. and a drift is being run in the vein at the 114-ft. level and a crosscut on the same level intersecting three other veins. A large staff are kept at work. The Columbus capitalists, who are represented in the Gold Rock Co., have a high opinion of the possibilities of the district. Some of them are organizing another company under the name of the Manitou Mining Co., with headquarters in Columbus. They have acquired three locations in close proximity to the Big Master mine, which they will develop in the spring. The provisional officials are Dr. J. H. Moninger, president; J. E. Pixley, vice-president; Dr. J. W. Hyatt, secretary.

Everything is almost in readiness for the electric smelting experiments at Sault Ste. Marie. Dr. Heroult was in Ottawa, Oct. 23, making final arrangements. Dr. Eugene Haanel, superintendent of mines, states that the construction of the furnace with overhead work is complete and the bins, elevators and crusher in position. All that is lacking is the electrodes from Sweden, which are on their way from Boston, the cable for the current and the measuring instruments in the arrival of which it is hoped no delays will occur. When these are in place the experiments will proceed immediately.

Sudbury. Oct. 26.

The lot held by Nicholas Rowe in the third concession of the township of Waters under mining lease, also the mining lease on the fifth concession of the township of Coffin has been cancelled by the Minister of Lands and Mines for non-payment of dues.

A meeting has been called to convene this month at Sault Ste. Marie to discuss mining matters along the line suggested by the Minister of Lands and Mines. One will also be held at the town of Sudbury, though no date has yet been set. The plan suggested by the present Minister is to hold meetings at various mining points and ascertain the views of these in the business so that legislation may be enacted to meet the wishes of mining men.

The mixer at the steel plant of the Lake Superior Consolidated Co., at Sault Ste. Marie, is now completed and is of 150-tons capacity; it will be in operation in a few days.

Last week Hon. Chase Osborne, of Sault Ste. Marie, Mich., in company with Eugene Coste, visited Sudbury and then went out into the township of Hutton to examine the immense iron-ore deposits in that township. Mr. Osborne is largely interested, together with Mr. Spry, of Chicago, who was also in the party. Mr. Coste has been examining several large iron deposits in Ontario, more particularly the Loon lake and vicinity near Port Arthur, in behalf of Mackenzie & Mann. The latter gentlemen have already surveyed a railroad into the township of Hutton, tapping the iron range, and we understand that there is every likelihood of further work being done at an early date.

The annual meeting of the stockholders of the Shakespeare Gold Mining Co. was held at the township of Shakespeare, near the village of Webbwood, last week. Following the election of directors the officers chosen were as follows: C. L. Twohy, president; T. W. Trotter, vice-president; A. L. Hoffman, secretary; and F. H. Hughes, treasurer. All the old directors were elected, though we are informed that the opposition was strenuous at times.

Application has been made to the High Court for an order to wind up the North Shore Copper & Smelting Co. The company was operating in the township of Aberdeen in the district of Algoma, and several Pennsylvania stockholders wish to discover, through the courts, the disposition of some $12,000 received for sale of common stock, claiming that the mining property still remains in its virgin state.

Inspector Mickel has thrown open many of the claims staked at Cobalt, which has had a real tendency to separate the sheep from the goats. The wholesale staking of lots without discovery of valuable mineral in place has been altogether too common. It looks now as if the inspector's action will have the good effect of preventing the blanketing of claims.

Victoria, B. C. Oct. 23.

Coast.—Preparations are being continued for resuming smelting at the works, at Crofton, Vancouver Island, recently acquired from the Northwestern Smelting & Refining Co. by the Britannia Smelting Co. It is anticipated that before the close of the current year a sufficiently large supply of ore, chiefly from the Britannia mine, Howe Sound, will have been received to admit of a continuous run being made for several months. Among improvements in progress are the construction of additional storage bins for ore and concentrate, and the installation of a brick-making plant for the purpose of making into bricks fine ore, concentrate, flue dust, etc., together with improved appliances for drying the bricks by hot air.

Shipment of ore in quantity from the King Solomon mine, Koksilah, Vancouver Island, has been arranged for, a contract having been let for hauling 1,000 tons by wagon to Cowichan station, on the Esquimault & Nanaimo railway, for shipment thence to the smelter. There are at this mine large showings of ore, near the surface, estimated to run from 5 to 20% copper, with small gold and silver values as well. Trial shipments of about 56 tons gave returns that left a good margin of profit above mining and smelting costs.

East Kootenay.—A serious fire, reported to have been of incendiary origin, occurred at the St. Eugene mine, Moyie, Oct. 6. The buildings and machinery over the main shaft were destroyed, the direct loss being estimated at about $30,000. As the mine must be kept closed down until a new plant shall have been installed, the indirect loss to the miners and business men of Moyie will be considerable. The shaft did not cave in, although the timbers were burned for about half way down. During the fiscal year ended June 30 last the St. Eugene produced ore from which about 19,217 tons of metallic lead were smelted. This mine is the chief source of lead-ore supply for the lead smelters at Nelson and Trail; so the suspension of production will probably compel a curtailment of operations at those works.

Rossland.—The structural survey of Rossland camp, by members of the Geological Survey Department of Canada, that has been in progress for several months, is stated to have been completed, and the officials who were engaged in it have returned to Ottawa. It is understood the geological structure of the camp has been found to be of extraordinary complexity.

Nelson.—The Canadian Metal Co., which is building a zinc smelter at Frank, southwest Alberta, has secured control of the smelter at Pilot Bay and of the Blue Bell mine, both on Kootenay lake. The Blue Bell is the oldest lode mine in the province, and the Pilot Bay smelter was the first to smelt any considerable quantity of ore. Both have been inoperative since the spring of 1896.

The concentrating plant at La Plata Mining Co.'s Molly Gibson mine, near Nelson, will shortly be completed and in operation. Development work at several levels in the mine has proved the occurrence of high-grade silver-lead ore in considerable quantity.

Mexico. Oct. 17.

Guanajuato is rapidly recovering from the effects of its recent flood, and machinery is being taken in there in large shipments. Thomas H. Leggett, who has taken over from H. L. Hollis and Walter M. Brodie the properties of El Cubo, under a working bond for an English company, known as El Cubo Venture, Ltd., will make a number of additions to the plant, besides continue the old tunnel by which the former bonanzas were encountered. The Dwight Furness Co. is doing considerable development work in the San Geronimo district. The Luz Mining & Drainage Co., of Philadelphia, whose principal holdings consist of La Luz and Bolañitas, has at last got on a solid footing, with about $10,000,000 gold capital, and will now proceed with the 12,000-ft. tunnel for the unwatering and developing the 1,000 or more pertinencias it controls. The Guanajuato Consolidated Mining & Milling Co. continues to develop large ore reserves in its Sirena mine, and from its 60-stamp and tube mill, with the 100-ton cyanide plant is making a profit of $50,000, Mexican, a month, and is preparing to increase the cyanide plant to 200 tons. The Guanajuato Reduction & Mines Co., which is unwatering the Cata, Valenciana and others near by, expects to have its 80-stamp mill at the Cata mine in readiness for Jan. 1, 1906. From these the pulp will be conveyed through pipes about 2 miles to the old Flores Hacienda (or patio plant), where the cyanide plant is nearing completion.

In the State of Oaxaca the Rosario y Anexas Mining Co. is putting in a 10-stamp mill at Etla. Wm. W. Thompson, of Thompson & Vickery, of Oaxaca, has bought out the interests of the latter, and together with T. M. Lehmer, former general manager of the San Baltazar Copper Co., of Oaxaca, will proceed to develop the properties on a large scale. The Toltec Mining & Smelting Co., of which A. W. Cunningham, of Waco, Texas, is president, has ordered machinery for an 100-ton concentrating plant at Ayutla, and will ship the concentrates to Teziutlan, meantime keeping up the development work; and it is understood that the Teziutlan Copper Co. has bought Los Ocotes de Cobre mines for $750,000, Mexican, and that new machinery has been ordered, and the property will be opened on a large scale by the Teziutlan Co., which, with its smelting plant located at Teziutlan, State of Puebla, has been recently reorganized as the Teziutlan Copper Mining & Smelting Co., of Trenton, N. J., with $10,000,000, gold, capital: R. S. Towne, president; Geo. D. Barron, vice-president and general manager; and R. E. Safford, resident manager.

London. Oct. 20.

A good deal of attention is being given by investors and speculators to El Oro Mining & Railway Co., which owns the mine of that name, 100 miles northwest of Mexico City. The chief reason for this attention is the hope that the recent bonanza strike at its neighbor, the Esperanza, of which I wrote recently, may be picked up in El Oro. To anticipate such a possibility is more or less guess-work, and is not really sufficient to induce buying of the shares at enhanced prices. The shares have, however, a much more solid foundation for their popularity at present, for, inasmuch as the new plant is now in operation and all paid for out of revenue, a resumption of dividends will take place before long. As such interest is now taken by British investors in American mines, a few details relating to the company may be given here. The company was formed in 1899 by the Exploration Co. to buy the property from an American company. The purchase price was £820,000 in cash and £66,000 in shares. In 1902 the adjoining property, the Somera, was acquired for £155,000 in cash. The issued capital of the company is £1,080,000. Up to the present time dividends amounting to about

£500,000 have been paid. About two years ago it was decided to erect an additional 100 stamps, bringing up the total to 200, and to provide tube-mills for the purpose of increasing the yield. At the time, the Exploration Co. was passing through a crisis, and it was felt better that the money required for the extension of the plant should be paid out of profits instead of by the issue of new capital. This policy has been pursued, and a sum of £200,000 has been spent in this way during the past two years. The new stamps started in April of this year, and the tube-mills are also in operation. The method of sliming by means of tube-mills and recovery of the gold by cyanide at this mill were fully described in your columns some months ago. During the year ended June 30 last 142,000 tons of ore were treated, mostly, of course, in No. 1 mill. The assay value of the ore averaged $14.52 per ton, and the recovery was $10.83 per ton, so that there is a large margin for the new tube-mills to work on. During this time the working expenses were $6.87 per ton. The total profit was £122,809, of which the bulk, as already stated, went to pay for the new machinery, and the sum of £32,000 was carried forward. Within the course of a few months steam power is to be replaced by electric power supplied by the Mexican Light & Power Co., and the cost, which is not at present specified, will be charged to revenue and spread over two years. It is expected that by means of this change the working costs will be reduced to about $5 per ton. As regards ore reserves, there is blocked out 672,000 tons, averaging $11, and there are also large bodies of ore not yet estimated. In addition developments are continually proving the presence of additional bodies, so that the mine has a long life before it. The company's property, the Somera, is also extremely promising, and it is here that there is a likelihood of striking the continuation of the Esperanza vein.

A few weeks ago I mentioned that, owing to the prospective exhaustion of the Lake View Consols, Ltd., West Australia, the directors were casting about for other properties, and that they had made a purchase of the control of a Broken Hill property. The accounts and report of Lake View Consols for the year ended June 30 are now published and give a good idea of the company's present resources. In addition to the Broken Hill South Blocks, they have acquired small interests in the Siberian Gold Dredging Syndicate and in the Inca Gold Development of Peru. During the year 110,000 tons of ore were treated, yielding just under $8 per ton, and a profit was made, after paying for reorganization of plant, development and all other expenses, of £28,000, out of which a dividend of £17,500 was paid, being at the rate of 5%. By means of the reorganization of the plant, the working costs have been reduced, the cost of mining and milling being now about $5 per ton, just half of what it was in 1902. The outlook for the future is not bright, as the ore reserves on June 30 were 87,000 tons, with an assay value of $8.50. The engineers state, however, that there is every prospect of further bodies of low-grade ore being opened up, and that the life of the mine will be much greater than is indicated by the figures for the ore reserves. The company had large funds in hand on June 30, amounting in one form or another to £170,000. Out of this there has recently been paid £73,000 for the Broken Hill property.

Sydney. Sept. 24.

The flourishing condition of the mines on the Broken Hill silver field is indicated by the reports of the several companies on the result of operations for the past half-year. The Broken Hill Proprietary Co. has completed the twentieth year of its existence, and the results obtained stamp this as the premier mine of Australia, and one of the greatest in the world. Twenty years ago there was issued the prospectus of the Broken Hill Proprietary Co., providing for a capital of £320,000 in 16,000 shares of £20 each issued as paid to £19. The prospectus held out the inducement to investors that "taking into consideraton the vastness of the lode, both in size and extent, together with its proved richness, the provisional directors believe that in placing these shares before the public they are inviting them to become partners in what appears to be one of the most valuable mining properties in Australia." The shares were taken up among 436 shareholders. Since then the number of shares has been increased to 960,000. The alluring prospects which were held out in the prospectus have been completely overshadowed by the actual results. During the 20 years, 7,747,300 tons of ore have been extracted, and at date there are still 3,200,000 tons of ore in sight, while the workings have only reached to a depth of 1,200 ft. The mine has produced 129,740,720 fine oz. of silver, 82,933 oz. of gold, 733,025 tons of lead, 7,201 tons of antimonial lead, and 4,576 tons of copper, of a net value of £26,808,743. The working expenses have aggregated £17,123,774, while a total of £939,000 has been written off for depreciation of plant. In the 20 years no less than £8,576,000 has been paid in dividends and bonuses, and this amount has been added to by a dividend of £72,000 declared during the present month. With respect to the past half-year's operations the net profit amounted to £147,671, the production of silver being 2,705,929 oz. fine, and lead 34,747 tons. The ore mined during the half-year amounted to 296,730 tons, and the profit per ton of gross ore treated was 9s. 11d. The price realized for the lead returned an average of 12s. 4d. per ton increase over that obtained for the preceding half-year. The zinc concentration plant was in full work for about three months only out of the six, and produced about 12,900 tons of concentrate. The whole of this product was disposed of, and contracts extending until the end of 1907 entered into at the rate of 40,000 tons per annum. The works for the manufacture of spelter are being erected at Port Pirie as rapidly as possible.

After an absence of four years the Broken Hill Block 10 Co. has again entered the lists as a dividend payer. This company has expended £80,000 on its new plant, and this, taken with the £920,000 distributed in dividends, brings the amount of profits for the 15 years up to £1,000,000 sterling. The Broken Hill South Co. distributed £35,000 in dividends during the past half-year, the net profits being £53,596. Exploration underground has been so successful that, despite the fact that nearly 100,000 tons of ore were broken during the term, the reserves now stand at 1,300,000 tons, or the same quantity as reported previously, while the company has 730,000 tons of residue at the surface averaging over 18% zinc. The North Broken Hill Co. also records a very successful half-year. The dividends during this term amount to £10,940. The conditions favor an increased output, the underground workings and the mill being now in first-class order. The ore reserves also show no depreciation, and are estimated at approximately 500,000 tons of ore. An agreement has been entered into by this company with the De Bavay Tailing Co. for the erection of the first unit of a plant for the treatment of zinciferous tailing, and should the process prove a commercial success, an extended contract is to be entered into.

The discovery of an extensive silver-lode at Coppabella, near Tumbarumba, on the southern border of New South Wales, has attracted considerable attention, and a large area of land has been taken up. The indications are certainly promising, but sufficient exploratory work has not been done on the lode to warrant the extensive speculation in shares which has taken place. The lode has a bold outcrop, and averages about 20 ft. in width; samples assayed at the Department of Mines gave a return of 19 oz. silver per ton, and 59% lead.

A specimen of quartz containing gold was exhibited at the Mines Department, Victoria, two or three weeks ago, which was taken from a winze at the 4,200-ft. level in the New Chum Railway mine, Bendigo. This is believed to be the greatest depth from surface at which the precious metal has been mined. The quartz contains pyrite, and specks of gold are clearly visible. The geological director, E. J. Dunn, says this discovery is especially interesting as establishing the fact that the conditions for the occurrence of payable gold are as favorable at this depth as in the upper levels.

General Mining News.

ALABAMA.

The operations in the upper Cahaba coalfield, in Jefferson and St. Clair counties, will hardly be in full blast until the coming spring. The Central of Georgia, the Seaboard Air Line and the Southern Railway are all building branch lines and spur tracks to mines in these fields. It is believed that before the middle of the coming summer the production in the new fields will be about equal to that of the mines at Pratt City. The coal in the upper Cahaba field is among the best in the State, and will be mined with ease after the seam has been struck.

JACKSON COUNTY.

Gunter Mountain Coal Co.—This company has been organized at Scottsboro, Ala., with $200,000 capital stock, to work coal deposits in the county. The company proposes to develop on a large scale, but it will be several months yet before coal is being mined for commercial purposes.

ARKANSAS.

SEARCY COUNTY.

Hurricane Zinc Co.—This company has been incorporated by Baltimore parties, who have bought the Hurricane zinc property at Kilburn, near the line of the St. Louis & North Arkansas railroad. The officers and directors are: Addison E. Mullikin, president; Dr. Arthur Lee Brown, secretary and treasurer; Andrew Hilgartner, Howard Carlton, Francis T. Home, W. F. Applegarth, J. J. Rutledge, W. F. Applegarth, Jr., and Roland R. Marchant. It is stated that the mining plant will be improved and some new machinery installed. About 25 men will be employed, working in two shifts, the capacity of the plant to be about 100 tons per shift. Dr. J. J. Rutledge is the engineer in charge, with office in Baltimore.

CALIFORNIA.

CALAVERAS COUNTY.

Utica Mining Co.—This property, at Angels, has closed down, so that shafts, ditches, flumes, etc., may be repaired and put in order before the rainy season sets in.

Del Monte Mining Co.—In this mine, Railroad Flat, the orebodies are opening well at several points. Seven stamps are kept running, and five stamps are to be added to the mill.

Yellow Boy Mining Co.—The shafts and drifts of the Red Gold mine of this company have been opened up, and some ore has been taken out, but cannot be milled until the winter storms bring the water.

INYO COUNTY.

Mount Whitney Co.—At this property, Lone Pine, the ore found in the recent strike in the long tunnel runs up as high as $200 per ton. Grading for a mill is now in progress.

Panamint.—Some 400 prospectors are now at work in South Park district, where there is plenty of wood and water. Most of these men have come in from Nevada. Many properties which have been idle for years are again in operation.

Ballarat.—The Radcliff property, at this place, is about to be sold. The vein is wide, but with the present plant the ore did not pay. It is expected that the ore will have to be roasted before cyaniding.

Side Issue.—From this claim, in Coyote Cañon, Panamint district, ore is being sacked and shipped. There are six claims in the group.

Mono Mining & Milling Co.—This company, of Los Angeles, W. W. Godsmark, manager, has a bond on the Sacramento mine, near Bishop. A 40-ton milling plant is about to be put up and connected with the mine by a gravity tramway. Electricity for power will be generated in Piute Cañon, two or three miles distant. There are five claims in the group bonded. The deepest workings of the mine are 450 feet.

KERN COUNTY.

Yellow Aster Mining Co.—This mine, at Randsburg, has a full crew at work, and the mill is crushing 600 tons of ore daily. More stamps are to be added, as there is plenty of ore in sight to keep 200 stamps running.

Butte Mining Co.—This mine, at Randsburg, P. H. McMahon, superintendent, is paying from $6,000 to $8,000 a month in dividends.

MARIPOSA COUNTY.

Quartzburg. — The Grimshaw mine, closed down owing to disagreement among owners, is being pumped out for examination for a prospective buyer. The California-Tennessee Mining Co. is building a dam to impound the tailings which are to be cyanided.

NEVADA COUNTY.

Mountain Maid.—Dr. C. A. Pusheck, owner of this mine, has started a crew at work. A free-gold ledge has been struck in the mine at 800 ft. depth. The ledge is 4 ft. in width and has indications of permanency.

Ironclad Mining Co.—Steam instead of electricity is to be used for power at this mine, and boilers to use oil fuel are being connected. A new hoist is being constructed.

PLUMAS COUNTY.

Gennessee Valley Group.—This group, known as the Gruss properties, has been sold to a company of which R. A. Watson is manager, and 20 men will be set at work at once. Milling facilities on a large scale will doubtless be provided.

SHASTA COUNTY.

Balakalala.—About 200 tons of sample ore from this mine, at Kennett, have been shipped to Denver, Colo., to be tested before the company commences work on its smelting plant.

Pittsburg & Mt. Shasta Mining Co.—This company intends developing at once the Nellie and Bennington mines, between Keswick and Iron Mountain, and will drive a 400-ft. adit.

Clara.—At this mine, Keswick, hoisting works have been erected and 10 men set at work. New pumps have been installed by Joseph Kahny, of Redding, the owner. The mine was at one time a good producer, but was closed on account of an excess of water.

SISKIYOU COUNTY.

Lanky Bob.—This mine, in the Salmon river district, has been sold to Geo. V. Gray & Co. for $17,800, and a small mill will be put up.

TUOLUMNE COUNTY.

Harvard.—This property, near Jamestown, has been sold at public auction by the sheriff of the county. It was sold for $20,000 to James E. Carroll, of Boston, Mass. The mine is equipped with a large mill and modern machinery.

TRINITY COUNTY.

Fisher Gulch. — This mine has been bonded by A. B. Morgan to Gordon Graham and Geo. W. Braden, who will at once put up a 5-stamp mill.

COLORADO.

GILPIN COUNTY.

Sleepy Hollow.—After an idleness of seven years, this property has been started up by its owner, J. F. Hopkins, of Denver, with James Carbis, Central City, as manager. The property has been practically idle since the flood of 1895, which caused the loss of 12 lives through drowning. The main shaft is down 800 ft., and is to be sunk deeper. Lessees will be put to work as soon as shaft is retimbered and levels cleaned out.

Penobscot.—Three carloads of machinery have been delivered at the Rollinsville depot, shipped by Cary & Fielding, of Denver, for the new mill of this company in Independent district.

Moose.—This group of claims, in Pleasant Valley district, has been leased and bonded for three years, in the sum of $60,000, by R. C. Bonney *et al.*, of Idaho Springs, to Charles Wimfheimer, of New York, and are to be developed by lateral workings from the Newhouse tunnel.

Bobtail.—Jenkins & Co., of Central City, have opened up some good ores between the 11th and 12th levels of the Bobtail, net returns for the first carload lot showing values of $65.55 per ton, and they will ship several hundred tons of first-class milling ores.

Little Gem.—A lease and bond for one year, in the sum of $30,000, has been given by W. M. Bloomer to W. T. Moulton, Sr., truseee, on the Little Gem group, in Moon gulch, Union district.

Independence.—A lease and bond in the sum of $10,000 for three years has been given by the Wacu Weta Co. to the Up-

To-Date Mining, Milling & Leasing Co., property being situated north of Black Hawk, in Mountain House district.

CLEAR CREEK COUNTY.

East Griffith.—W. D. Hoover, of Denver, who is the owner of this property, is having tests made for the purpose of determining the best method of treating the large orebodies of this property situated near Georgetown, and has decided to erect a 100-ton mill at an early date. The mill is to be on the concentration method.

Banner Investment Co.—Denver and Idaho Springs people have taken a lease and bond on the Silver Queen property, on Seaton mountain, and will open up through Newhouse tunnel at a depth of 1,100 ft. Property has produced $75,000 to date.

Perkins Tunnel.—A good strike was made during the past week in the breast of the tunnel near Idaho Springs, in what is believed to be the Bruce vein, the streak carrying high values in gold and silver.

BOULDER COUNTY.

Eldora Mining & Reduction Co.—This company has been organized for the purpose of taking hold of the big chlorination mill at Eldora, and will overhaul it and handle the custom ores of that section. J. H. Kemp, Eldora and Boulder, is manager.

Pollock Mining & Milling Co.—A new concentrating mill is to be built for this company near their mines at Summerville, near Salina, and C. M. Hampson is in charge of new work. The capacity is to be between 60 and 70 tons per day, and Wilfley tables are to be used, the company intending to put in a cyanide plant at a later date.

INDIANA.

Indiana mine operators say they are experiencing the worst car shortage and transportation facilities in the history of the coal production in the State. The production of the mines during the past week was scarcely 30% of the usual output, because of the scarcity of cars.

The Lynn coal mine near Bicknell caught fire Oct. 23, and the fire was not extinguished for four days, when the mine was flooded. The fire is supposed to have started when the blasts were fired, at quitting time, a small pocket of gas, common in all mines, igniting and setting fire to the coal. Wilson Moore, an old and experienced miner, was killed by falling slate while trying to extinguish the flames.

The Indiana Appellate Court in the case of the Collins Coal Co. vs. Hadley, has decided that an administrator may not sue to recover for the death of a miner due to the violation of the mining laws; that only the widow, children, parents or other dependent members of the family of a person whose death was caused by violation of the mining laws in failing to provide timbers, props, blackboards, etc., can sue for damages under Section 7473, Burns Statute.

The last has been one of the most active weeks in the high-grade oilfields of Indiana during the season. Fifty-nine wells were completed and among them were seven gushers, the best one having a production of 200 bbl. The boost in price occasioned new development work to spring up in all parts of the Indiana oil territory, and activity is promised from now to the close of the year.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—Foreclosure proceedings have been entered against the Jennings Refining Co., formerly known as the Union Refining Co., by F. C. Hubbell and J. R. Janet. Over $75,000 was expended on the plant, but no oil was ever refined.

The Crowley Oil & Mineral Co. is doubling the capacity of its pipe-line between Egan and Crowley.

Jennings Heywood Oil Syndicate, No. 5, has been brought in and flows 1,000 bbl. daily under air pressure.

NEW YORK.

WASHINGTON COUNTY.

Graphite is being mined by the Adirondack Mining & Milling Co., at Whitehall, in large quantities. The machine for separating and refining the graphite, invented by General Manager John Davis, is meeting with success and will be the means of making business brisk in the South Bay works. The company's South Bay graphite works are in the town of Dresden, and all the graphite is shipped by water four miles to the canal at Whitehall.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Hidden Fortune.—The principal Chicago stockholders of the Hidden Fortune Mining Co. have decided to take independent action against this company and those responsible for its present condition. A short time ago they sent Alexander Prussing to investigate the condition of affairs. The company's property is now in the hands of a receiver, and the company is burdened with claims of $127,038, besides the bonded indebtedness of $250,000. The attorneys for these Chicago people state that the bonded indebtedness can be easily annulled. They have sent out circulars to all the stockholders, stating the results of Mr. Prussing's visit to the property and announcing their decision to take action for the annulling of the bond issue. They believe that the ores can be treated so as to make the mine pay. Following are the points of their campaign: First, to take over the claims and securities held by A. Messer, trustee; second, to establish the position of the bondholders; third, to acquire the title to the property if the bond issue is declared invalid; fourth, to organize the company on a capital basis of actual values; fifth, to explore the Bingham vein; sixth, to establish a mill at the mine, if the values in the Bingham warrant (if not, to sell the property to the best advantage); seventh, to lease or sell the present mill; eighth, to operate the property solely as a commercial venture. In order to become identified with this movement stockholders must deposit stock and pay ½c. a share on their holdings. This is one of the first well-organized attempts to put the Hidden Fortune property again on its feet.

Homestake Extension.—The directors and principal stockholders of this company met in Chicago, Oct. 25. to decide definitely upon plans for the new 100-stamp mill which will be erected at once on the company's property, one mile west of town. The mill will have a cyanide annex and be completely equipped. The tunnel is now in 1,140 ft., and shows free milling ore of a good quality.

PENNINGTON COUNTY.

Gill City.—A new camp is about to be established on the road between Hill City and Keystone. It will be the first wolframite camp in the Black Hills. Several tests have been made upon the ore of this property. R. J. Truax, who is manager of the property, has made a test at an old mill at Keystone. The camp will be called Gill City, in honor of Mr. Gill, one of the members of the company. Mr. Truax has now gone to Denver, where he will buy machinery and make necessary arrangements.

Keystone-Holy Terror.—Work will be resumed at the old Keystone-Holy Terror within the next six weeks. A deal has been made by which sufficient money has been raised to put the mine on a sound financial working basis. The improvements contemplated include a cyanide annex to the company's mill. The Holy Terror is one of the oldest and best known mines in the southern hills. The vein, while narrow, carries high values.

TEXAS.

HARDIN COUNTY.

Saratoga.—The Sun Co., after drilling for over eight months and losing two wells, has succeeded in obtaining a well flowing 1,000 barrels.

Producers Oil Co. has a new flowing well on the Little Jap lease. This company's Alvey No. 1 has been abandoned.

Five wells are now being drilled, and the oil production has been steadier than in any other Texas field; it is still over 7,500 bbl. daily, and sells at 31c. and 32 cents.

JEFFERSON COUNTY.

Beaumont.—The story of the petroleum industry of southern Texas is one of mismanagement and folly, and only a very few well-managed, legitimate companies have made money, while millions of dollars have been squandered and field after

field ruined by being plugged full of holes. Oil has been forced out by compressed air and the wells exhausted in a few months, resulting in crude being sold for a tithe of its value, or being stored in badly constructed tanks, to evaporate, burn or be saved for a club to depress prices still lower. Criminal carelessness, greed and incapacity have wasted millions of barrels of oil, yet the stored crude (fortunately most of which is in the tanks of storage companies) exceeds 24,000,000 bbl., while the daily output is still in excess of consumption, although it is only about one-half of what it was in July.

The crude market is quiet, but the rapidly decreasing output of old fields and unfavorable reports from Dayton have stiffened prices. Prices will gradually rise if Dayton does not prove a big gusher field. Current prices are: Spindletop, 40c.; Humble, 30c.; Jennings, 25c.; Batson, 30c.; Saratoga, 31c.; Sour Lake, 37c. Daily production: Spindletop, 3,800; Sour Lake, 6,000; Batson, 8,500; Saratoga, 7,500; Dayton, 1,000; Humble, 29,000; Jennings, 25,000 barrels.

LIBERTY COUNTY.

Dayton.—There are about 15 wells drilling, and while the field is not yet a large producer, one of them is liable to be a gusher, and operators and oil buyers remember the long period required to bring in the Sour Lake field, and how it sent crude down from 75c. to 30c. It would be better for all parties if this field finally proved to be a pumping proposition. Wells drilling are as follows: Sun company, 3; Paraffine Oil Co., 5; Port Vernon Oil Co., 16; Beatty Oil Co., 1; Morning Star Oil Co., 2; West Liberty Oil Co., 1; Liberty & Marble Falls Oil Co., one.

UTAH.

BEAVER COUNTY.

Majestic Copper.—At a depth of 465 ft. in the Harrington & Hickory property, a vein of ore has been encountered, 2½ ft. of which averages about 60% lead and 80 oz. silver. Shipments are now being made from this mine.

Burning Moscow.—This property has been the scene of some quite important development during the past few months and regular shipments are being made.

JUAB COUNTY.

Carisa.—This Tintic mine has marketed this month 750 tons of ore, the values of which ran about 5% copper, 7 oz. silver and $2 in gold.

Mammoth.—Lessees are now doing the principal work in this property, but the management expects to maintain about the usual output.

United States Mining Co.—This company has acquired several patented claims, which have been added to the Centennial-Eureka group.

SALT LAKE COUNTY.

Silver Shield.—A deal has been closed with the Boston Consolidated Mining Co. for enough ground for a mill site near the mouth of the Silver Shield tunnel. The mill will not be built until next year. H. S. Joseph, of Salt Lake is manager.

South Columbus.—The property at Alta has been closed down for a few months.

Utah Apex.—The Parvenue tunnel, which is to be the main avenue through which ore mined in this property in the future will be taken out to the surface, has been finished to a distance of 615 feet.

Kennebec.—W. J. Craig, of Salt Lake City, manager, has let another contract to continue the upper tunnel, being run to tap the older workings of the mine, for another 300 feet. It is expected this property will be a regular shipper next year.

Columbus Consolidated. — This Alta mine is marketing about 30 tons of crude ore per day, which nets the company about $37 to the ton. A recent lot sold to Salt Lake smelters netted $69 to the ton.

SUMMIT COUNTY.

Columbus.—Ore of a shipping grade has been encountered in the tunnel, 300 ft. in, of this Park City property.

Little Bell.—In a drift, 200 ft. off from the main crosscut in this property, high-grade shipping ore has been encountered. The body is a large one, yet it is not expected that the contact will be cut before another 40 ft. is run. The property adjoins the Quincy mine, now owned by the Daly-West, and is similar in character.

Odin.—This is another Park City mine that has responded to development work in a very encouraging manner recently.

TOOELE COUNTY.

Consolidated Mercur.—In a drift on the 200-ft. level a large body of oxide ore has been broken into. It is near the Ingot mine side lines, and is an extension of a shoot discovered in the east portion of the property about six months ago.

WASHINGTON COUNTY.

Paymaster.—The initial shipment of copper bullion from the smelter owned by this company has been marketed. The lot consisted of 81 bars. S. L. Adams, of Provo, is manager.

Utah & Eastern. — This company's smelter at Shern City will go into commission again next week. The plant has been closed since the caving in of the incline shaft several months ago, which caused the shaft to be abandoned. The company is running a tunnel, which will shortly be connected with the mine workings.

WASHINGTON.

OKANOGAN COUNTY.

Copper World Extension.—The main shaft is down 175 ft. and has passed through a valuable vein of copper-iron sulphide ore, 10 ft. wide, of good shipping value in copper and gold.

At the annual stockholders' meeting, held at Loomis, Wash., Sept. 21, the following directors were elected for the ensuing year: Raymond Zirkle (assistant cashier Market Exchange Bank, Columbus, Ohio), Adam Innis, E. E. Fisher, Oliver Orr, R. W. Bell, W. A. Snow and S. C. Slabaugh, all of Columbus, Ohio, and Henry Barhs and L. Wentworth, of Loomis, Washington.

Favorite Gold & Copper Mining Co.—At the annual shareholders' meeting, held at Loomis, Oct. 7, the following gentlemen were elected to serve as directors for the ensuing year: J. M. Parker, J. F. Baldridge, W. F. Bort, R. T. Wolf and C. J. Sanders, of Nelsonville, Ohio; A. E. Faine and Calvin Essex, of Straitsville, Ohio; W. R. Calkins, Columbus, Ohio, and and William T. Peterson, Nighthawk, Wash. The directors have elected J. M. Parker, president, and J. F. Baldridge, secretary. The upper tunnel of the Favorite mine is in 950 ft. A lower tunnel is in 100 ft. The company is planning to crosscut and drive on the vein. The work will be done by contract.

Night Hawk Mining Co.—At the annual shareholders' meeting held at Loomis, Wash., Oct. 7, the following board of directors was elected to serve the ensuing year: Edwin Reynolds, P. Meehan, Charles A. Druse, A. W. Schweder and H. D. James, of Milwaukee, Wis.; Edward Kolb, of Fond du Lac, Wis., and Charles T. Peterson, of Nighthawk, Washington.

Nighthawk Realty Co.—At the annual meeting of shareholders, held at Loomis, Wash., Oct. 7, the following board of directors was elected to serve for the ensuing year: E. N. Cranzs, P. Meehan, W. J. O'Connor and H. D. James, of Milwaukee, Wis., and Charles T. Peterson, Nighthawk, Wash. Besides other business before the meeting, a dividend (the first) was declared of 60% on the capital stock of the company.

Douglas Mountain Mining & Tunnel Co.—At a meeting held at Loomis, Sept. 20, the following were elected as the board of trustees for the ensuing year: G. E. Bazler, J. J. Bennett, J. F. Nitschke, O. E. Knisely, O. P. Anderson, Dr. W. H. Christopher, J. H. Eutsler, G. L. Stephan and J. R. Francis, all of Ohio.

WYOMING.

LARAMIE COUNTY.

The Burlington railroad spur to the Chicago, the iron mine which the Colorado Fuel & Iron Co. has been opening up, has been completed and shipments of ore will soon be made. This branch is nine miles long and runs from Guernsey up Whalen cañon on the west side, going near the Good Fortune and other iron mines. The Chicago is being opened up by two shafts of about 200 ft. depth and by surface openings in three terraces. A tunnel is also being worked. The ore is a hematite which runs from 55 to 65% iron, and is almost entirely free from phosphorus.

ALASKA.

It has been known for several years that there is a large area of copper-bearing country around the headwaters of the Tañana, White and Copper rivers, Alaska, but they were not developed on account of transportation difficulties. These, however, will shortly be overcome. The first section of 35 miles of the railroad projected to open up this part of Alaska is now being constructed. Its primary object is to tap the copper deposits located on Copper river, about 90 or 100 miles above its tidewater terminus at Valdez, with the ultimate intention of extending it across country to Eagle City, on the upper Yukon, within easy reach of Dawson City. It was reported some time ago that these deposits had passed under the control of a syndicate of San Francisco and London capitalists.

The later discoveries reported at the headwaters of the Tanana relate to native copper lying in stringers and sheets in the greenstone formation, as the metal is found in the Lake Superior mines. The natural outlet for these new deposits is said to be through the Copper river valley to Valdez. The Havemeyers, of New York, are reported to be interested in one group of copper properties at the headwaters of one of the tributaries of the Tanana and have a force of miners at present employed in developing them.

According to the custom returns given out by the Department of Commerce, the copper ore shipped to the United States during the first seven months of 1905 amounted to 16,414 tons, valued at $331,923, as against a value of $89.867 in the corresponding period in 1904. The July shipments amounted to 4,856 tons.

It is reported that a large seam of anthracite of good quality has been found in the Matanuska district, on ground owned by the United States government. It will therefore be necessary for the prospectors to secure their ground by the ordinary processes of claim-taking and occupation.

Godfrey Chealander, who has made a tour of Alaska under the auspices of the Alaska Club, in the interest of the Alaska exposition, reports much activity at Nome, in the Yukon Basin and throughout the Tanana Valley country.

"Now that the miners have returned to the American side," said Mr. Chealander, "all the old camps that were nearly deserted when the stampedes were on for the Klondike are being worked again, with results satisfactory to the miners. The Forty Mile country, the Eagle, Circle, Rampart, and other districts have all made splendid showings the past season. Rampart, with a good water supply this year, has produced about $150,000. Large hydraulic plants are being installed there and it will be a good district for many years to come.

"The Seward Peninsula and the Tanana Valley are the two great districts in Alaska today. Both are splendid producers and both have only just commenced operation. I would say that estimating from conservative opinions and reports the gold output from each district the past year has been from $4,000,000 to $5,000,000.

"Nome is one of the most active mining camps in the world today, with Tanana as a close second. A large amount of capital is being expended in the Nome district for development work. The output of gold from Nome and the Seward Peninsula during the next ten years will be very large."

Foreign Mining News.

ASIA.

CHINA.

A recent consular report says that an important concession has lately been obtained by Sir. John Lister Kaye in the province of Anhui, Yangtse Valley, where it is believed a large deposit of iron ore exists, distant only 3½ miles from the Yangtse river. A preliminary mining concession on behalf of the London & China Syndicate was obtained in 1902, and after shafts had been sunk and faces exposed the syndicate made arrangements with Messrs. J. & P. Higson, of Manchester, to send one of their mining engineers to report on the spot. In consequence of this report, Sir John Lister Kaye presented the documents appertaining to the concession, through Sir Ernest Satow, to the Wai-wu-pu in March, 1904.

Notwithstanding serious obstruction on the part of Chinese officials, the sanction of the Imperial Chinese Government was obtained, and the final contract was signed at Peking on June 5. The concession is granted for a period of 60 years, with a possible extension, and the total area of the concession is about 50 square miles, or 32,000 acres. Messrs. Higson estimate that there are 6,500,000 tons of iron ore in sight.

CANADA.

BRITISH COLUMBIA—VANCOUVER ISLAND.

Tyee Copper Co.—This company reports that during the month of September its smelter at Duncan's Station ran 11 days and treated 1,919 tons of Tyee ore, giving a return, after deducting freight and refining charges, of $35,019. This shows an average of $18.25 per ton.

EUROPE.

BELGIUM.

The output of the Belgian blast-furnaces for the eight months ending Aug. 31 was as follows, in metric tons:

	1904.	1905.	Changes.
Bessemer and basic	688,301	680,957	I. 42,656
Forge iron	162,637	141,749	D. 20,888
Foundry iron	70,450	67,895	D. 2,555
Total	871,388	890,601	I. 19,213

There was a heavy reduction in forge iron. There were 35 furnaces in blast, an increase of two over last year.

SPAIN.

Imports of fuel into Spain for the eight months ending Aug. 31 were 1,437,437 tons of coal and 91,743 tons of coke. Exports of minerals for the eight months are reported by the *Revista Minera* as below, in metric tons:

	1904.	1905.	Changes
Iron ore	4,899,041	5,449,859	I. 550,818
Copper ore	734,380	698,199	D. 36,181
Zinc ore	86,158	92,579	I. 6,421
Lead ore	3,610	4,514	I. 904
Pyrites	358,717	463,524	I. 104,807
Salt	259,205	273,869	I. 14,664

Exports of metals were 39,835 tons of pig iron, an increase of 10,910 tons; 16,989 tons copper, a decrease of 3,914 tons; 1,135 tons of spelter, a decrease of 316 tons; 114,637 tons of lead, a decrease of 5,224 tons.

Coal Trade Review.

NEW YORK, Nov. 1.

ANTHRACITE.

The hard-coal market continues to show its general improvement. Like soft coal, anthracite is handicapped by lack of transportation, and for this reason demand is becoming exceedingly urgent in some quarters. Unlike soft coal, the line trade in anthracite is holding its own, and is not slighted in favor of tidewater shipment. The present fine weather is holding back active demand on local dealers, but the appearance of winter in the West is a sign that the present warm spell cannot last.

Prices remain at the old level: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

The strong condition of the Atlantic seaboard soft-coal trade continues, and producers are able to get sufficient coal to market to supply their orders, which are accumulating. Lack of car supply continues to limit production at nearly all mines, at some more than others. Embargoes on foreign roads are still in force, and from all appearances are not likely to be removed for several months, since the main-line roads which tap the coal region do not care to allow their cars to go out on long all-rail hauls.

Prices continue about the same as reported last week; some West Virginia coal has sold at New York harbor shipping points at $2.40@$2.50, while the ordinary grades are bringing $2.60 and the better ones going to $2.90@$2.95. Considerable delay in loading vessels is reported from Norfolk and Newport News.

Trade in the far East is active, and the contractors are calling for considerable coal as a stock ahead for winter. The ice-making ports, as usual, are calling for the last additional cargo before they have to close.

Trade along the Sound is taking on all the coal it can get, and many producers are having to hold these consumers down to the amount of the monthly proportion allowed to them by their contracts. Boats

for the transportation of coal to the Sound are scarce.

New York harbor has shown a slightly easier market during the week on account of the arrival of some unexpected West Virginia coal. This has been absorbed easily and has merely helped things along without alteration of prices. All-rail trade is calling for more than can be given to it, and prices are strong; $1.25@$1.50 at mines, according to grade, is easily obtained.

Car supply is down to one-quarter of the requirements in some places, although it is better than this generally, and some producers are getting nearly their whole needs. On one or two of the main-line roads there has been some question of fairer allotment of coal from distributing centers. Transportation is slightly more variable than it has been, though still fairly good, and loading facilities at most of the ports are holding up well.

Light-draft vessels in the coastwise market are in short supply and in strong demand; of the large boats, a sufficient supply is on hand. Current rates from Philadelphia are: To Boston, Salem and Portland, 80c.; to Lynn, Newburyport, Gardner and Bangor, $1; to Portsmouth and Bath, 85@90c.; to the Sound, 70@75c.; to Saco, $1.10 and towages.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Oct. 21, in short tons:

	1904.	1905.	Changes.
Anthracite	3,597,045	3,647,170	I. 50,125
Bituminous	21,667,846	23,619,364	I. 1,951,518
Coke	6,835,290	8,847,101	I. 2,011,811
Total	32,100,181	36,113,635	I. 4,013,454

The total increase was 12.5%, about half of it being in coke.

Shipments of coal over the Southern railway for the eight months ending Aug. 31, are reported as follows: Tennessee mines, 1,042,308; Alabama mines, 1,176,072; total, 2,218,380 tons.

Birmingham. Oct. 30.

There is a demand for every ton of coal that can be mined in Alabama and the various companies, furnace and commercial both, are doing all in their power to get out the largest possible production. The month just coming to a close will show a better output than during any one month since the union miners' strike began in July, 1904.

There is a better production of coke in the State. The Alabama Consolidated Coal & Iron Co. is considering the construction of 100 more coke-ovens immediately on the completion of the present contracts with J. M. Meighan and others.

Chicago. Oct. 30.

Owing to lack of cars and a good demand for coal at the beginning of the active season, the demand for all grades of bituminous is active, though sales are not abnormally heavy. Cool weather in the last week has resulted in large demands for anthracite and household grades of bituminous, and the prospects are that this demand will continue unchecked into the winter. Consumers, according to all reports, have not as yet laid in their winter stocks generally.

Indiana and Illinois mines are working on one-half to one-third time, according to reports. Some mines are down to one-fourth of the normal capacity, it is said. The effect of these curtailments is that coal is comparatively scarce, and the customary surplusage on track has disappeared.

Eastern bituminous coals are to advance Nov. 1 by 20c.@25c. a ton, for domestic grades. Smokeless lump and egg will be advanced to $5.50 and run-of-mine will go up to $3.55. Hocking will be quoted for November at $3.50 for lump. Sales of both smokeless and Hocking continue good, though hampered by the car shortage.

Illinois and Indiana coals will be probably advanced also, as regards domestic sizes, though definite figures are not yet obtainable. At present lump and egg are selling at $2.50@$3; run-of-mine, $1.70@$2; and screenings at $1.10@$1.40. The demand for steam coals is slowly increasing.

Cleveland. Oct. 31.

Coal prices are strong, principally as a result of a short car supply. Most of the mines in this territory are running half-time. The car supply is now rated at about 45% of normal. The two things have resulted in better prices for domestic consumption. Run-of-mine steam coal is now selling at $1.10 at mines, Ohio and Pennsylvania, with possibilities of higher prices. Slack is also strong, with a good demand. Ohio mines are now selling at 75c.@80c. at the mines, and some of the Pennsylvania mines are at 70c.@75c. at the mines.

The lake situation has taken a spurt. Coal is now being sold to the northwestern trade at $2.10 f. o. b. boats at Lake Erie docks. Boats are so much in demand that rates have advanced to 60c. to Lake Michigan and 50c. to Lake Superior points.

Domestic coal prices in this territory are now strong. The Massillon producers have made the price of selected lump $2 a ton at the mines.

Coke prices are now exceedingly strong. Prices quoted today are $3.50@$4 at the oven for the best grades of 72-hour foundry coke, and $3.25@$3.50 for furnace coke.

Pittsburg. Oct. 31.

Coal.—The demand is improving and prices are firmer this week. The minimum quotation is on the basis of $1.20 a ton for run-of-mine at the mine. The Pittsburg Coal Co. has advanced the price of all coal on the lake docks 20c. a ton. This is the third advance within six weeks and prices are now 45c. a ton higher than during the summer. The shortage of railroad cars is interfering with production, but many of the mines are being operated satisfactorily. All the river mines are running and there are plenty of empty coal boats and barges in the pools.

Connellsville Coke.—For immediate delivery $3.50 a ton is being asked for furnace coke, but for delivery in the first quarter of next year furnace coke is quoted at $3 a ton and foundry at $3.50. It is reported that the H. C. Frick Coke Co. has bought the entire product of the Rainey interests for the first six months of next year, which puts that concern in almost complete control of the strictly Connellsville coke. While the report has not been denied, it has not been officially confirmed. The car supply was better last week and there was a slight increase in shipments. The production for the week is given at 267,769 tons. The shipments from the Connellsville field aggregated 11,650 cars distributed as follows: To Pittsburg and river points, 4,228 cars; to points west of Pittsburg, 6,162 cars; to points east of Everson, 1,260 cars. This was a gain of 80 cars compared with the preceding week. The total shipments from the Connellsville and Masontown fields for the week amounted to 338,728 tons.

San Francisco. Oct. 26.

The coal trade continues quiet, and supplies are sufficient, notwithstanding the light receipts of Australian coal this year.

For coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Nov. 1.

Exports of coal and coke from the United States for the nine months ending Sept. 30 are reported by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1904.	1905.	Changes.
Anthracite	1,781,562	1,736,779	D. 44,783
Bituminous	4,687,808	5,286,192	I. 598,384
Total coal	6,469,370	7,022,971	I. 553,601
Coke	392,929	455,687	I. 62,758
Total	6,862,299	7,478,658	I. 616,359

There was a decrease of 2.5% in anthracite exports, but increases of 12.8% in bituminous and 16% in coke; making a gain of 9% in the total.

The coke went chiefly to Mexico, with some shipped to Canada also; the latter being taken by blast-furnaces in Ontario. The coal exports were delivered as follows:

	1904.	1905.	Changes.
Canada	4,956 898	5,379,334	I. 422,436
Mexico	686 291	661,398	D. 24,893
Cuba	342,483	384,106	I. 41,623
Other West Indies	186,859	221,485	I. 34,626
France	9,770	2,319	D. 7,451
Italy	66 047	67,428	I. 1,381
Other Europe	48,881	22,688	D. 26 194
Other countries	172,541	284,213	I. 112,072
Total	6,469,370	7,022,971	I. 553,601

The greater part of the exports are to adjacent countries—Canada, Mexico, Cuba and the other West Indies. The coal to other countries goes principally to South America. Exports to Canada in detail were as follows:

	1904.	1905.	Changes.
Anthracite	1,759.745	1,7 3,037	D 46,708
Bituminous	3,197,153	3,666,297	I. 469,144
Totals	4,956,898	5,379,334	I. 422,436

Canada took this year 98.6% of the anthracite and 69.3% of the bituminous coal exported.

Imports of coal into the United States for the nine months ending Sept. 30 are reported by the Bureau as follows:

	1904.	1905.	Changes.
Canada	901,399	967.511	I. 66 112
Great Britain	88,157	49,340	D. 38,817
Other Europe	50	359	I. 309
Japan	41,378	41,636	I. 258
Australia	155,500	121,639	D. 33,861
Other countries	980	38	D. 942
Total Coal	1,187,464	1,180,523	D. 6,941
Coke	.....	42,929	I. 42,929
Total	1,187,464	1,223,452	I. 35,988

Coke was not reported separately last year. It comes chiefly from British Columbia, with a little from Germany.

Of the coal imported this year, 19,678 tons were classed as anthracite; the balance was bituminous. With the exception of some Nova Scotia coal, which comes to Boston, the imports from Canada were British Columbia coal, recevied at California ports. There was a large decrease this year in Australian coal, which comes to California.

Iron Trade Review.

NEW YORK, Nov. 1.

From all quarters we have reports of activity and strong demand for material. Pig iron and finished material are called for in increased quantities, and the question with buyers seems to be not the price, but the time of delivery. Pool or association prices are not regarded, and premiums are paid for such deliveries as can be had.

In short the market seems to be running away with itself, and there is every prospect that the scramble for material has begun. In some lines—such as structural material, plates and rails—the mills have their capacity engaged for almost the whole of next year. The great demand is causing an advance in coke prices, and furnaces will have to pay well for their fuel.

United States Steel Corporation.—This company's advance statement for the quarter ending Sept. 30 shows that the net earnings was $31,240,582, an increase of $12,466,550 over the corresponding quarter in 1904. For the nine months ending Sept. 30 the net earnings were $84,571,994, an increase of $32,861,704 over last year. The income account for the quarter is as follows:

Net earnings	$31,240,582
Interest and sinking funds	$7,472,097
Depreciation and reserve	5,558,781
Special improvements	1,232,172
Total charges	$14,263,050
Net balance	$16,977,532

From this balance there is appropriated $6,304,919 for the quarterly dividend, 1¾%, on the preferred stock, and $6,500,000 for new property and construction; leaving a balance of $4,172,613 to surplus. The unfilled orders on Sept. 30 amounted to 5,865,377 tons of material; an increase of 1,575,722 tons over June 30, and the largest quantity ever reported.

Birmingham. Oct. 30.

The Alabama pig-iron manufacturers who are in a position to handle any business for delivery this year, can almost command any price they want. The market is very strong and prices are looking up. Some sales have been made in this district at $14 per ton for No. 2 foundry, and predictions have been made that before the expiration of another 60 days the price will have gone up to $15. Special analysis iron is bringing $15 per ton now, while immediate delivery iron, in very small lots, is bringing $14 flat and even better. Consumers who do not buy regularly in this market are not finding it an easy task to get a quantity of iron here at any price. There is no disposition to sell except to regular customers, and then time is required for delivery. Some complaint is still heard as to the car shortage. President J. C. Maben, of the Sloss-Sheffield Steel & Iron Co., stated a few days since that the railroads were doing a little better in the immediate Birmingham district, but in the outlying districts the conditions are not so favorable.

The following iron quotations are given: No. 1 foundry, $14@$14.50; No. 2 foundry, $13.50@$14; No. 3 foundry, $12.50@$13; No. 4 foundry, $12; gray forge, $11.50@$12; No. 1 soft, $14@$14.50; No. 2 soft, $13.50@$14.

In cast-iron pipe there is no change, great activity being noticed on all sides. The Tennessee Coal, Iron & Railroad Co. will erect during the next six or eight months one of the largest cast-iron pipe plants in the South at Ensley.

Chicago. Oct. 30.

In the local iron market the principal feature of interest is the increased demand of melters for the iron they will need between July 1 and Dec. 31, 1906. That buyers have confidence in the strength of the market is shown in their desire to cover needs for the last half of next year. That sellers have like confidence is shown in their absolute refusal, in some cases, to make contracts for the last half of 1906, and their demand in general for high prices on such contracts.

There is still a demand for spot iron—30 to 60 days between order and delivery—and the iron is to be had, on payment of 50c. to $1 over market prices for delivery next spring.

Sales in the last week have aggregated a heavy tonnage, with no single orders of extraordinary nature. Southern iron seems to be the chief seller.

Northern is quoted at $17.75@$18.25 for No. 2; Southern No. 2 brings $13.50@$14, Birmingham, or $17.15@$17.65, Chicago. Northern charcoal is much in demand and scarce; it brings $18.50@$19.50.

Structural material, plates, bars, sheets and railroad supplies are in strong demand. Railroad supplies are especially in request. Coke is rising steadily in price, and the demand is very good. Shortage of shipments still is the significant feature. Connellsville 72-hour brings $6.15@$6.65, Chicago, or $3.50@$4 at the ovens. The demand is great for all grades.

Cleveland. Oct. 31.

Iron Ore.—The strong demand for boats in other lines of trade and the advances in the rates have brought about a sharp rise in the wild rates on ore, $1 from the head of the lakes being paid. Wild tonnage is not much in demand, the shippers using their contract vessels almost entirely and the wild tonnage sparingly.

Pig Iron.—The scarcity of iron for immediate shipment has advanced prices rapidly of late. Some No. 2 foundry has been sold at $17 in the Valleys for quick shipment, while iron for delivery during the first quarter of next year is selling freely at $16.50 in the Valleys for No. 2. Bessemer, basic and malleable are also scarce. Some sales of basic for prompt shipment have been made at $16.75 in the Valleys, while material for advanced delivery is selling steadily at $16.50 in the Valleys.

Finished Material.—Structural steel is so strong that for spot shipments some of the jobbers in this territory have sold beams and channels at 3c., Cleveland. Among the buyers at those prices are numbered some of the biggest consumers of the country. Only a few mills have anything to sell, but they are getting prices ranging $10 at the mill above the association list. Most of those producers are in the East. Plates are commanding

a premium of $2 to $4 a ton at the Eastern mill for delivery in this territory. Delivery is promised in shorter time from the larger mills than on structural. Billets are commanding any price which the consumer can afford to pay. Forging qualities have sold as high as $32, Cleveland, while bessemers are selling at $28. Pipe is a little stronger, the mills now joining in a quotation of 80 and 5 off list. Bar iron is selling in big lots for advanced delivery at 1.75c., Youngstown, and at 1.80c. for quick shipment. Bar steel is steady at 1.50c., Pittsburg, with deliveries possible inside of two to four weeks.

New York. Nov. 1.

Pig Iron.—Business continues active; large sales are reported, and some big contracts are under negotiation. The furnace-owners are firm in their views, and no concessions can be had.

Prices are firm. For Northern iron in large lots, we quote: No. 1X, $18@$18.25; No. 2X, $17.75; No. 2 plain, $17@$17.25; forge, $15.75@$16.75. Basic is still in demand; $17.50@$17.75 is asked for Alabama, and 25c. less for Northern. Virginia foundry is held around $18 for No. 1 and $17.50 for No. 2. For Southern iron, on dock, quotations are higher: No. 1 foundry, $18@$18.25; No. 2, $17.50@$17.75; No. 3, $17@$17.25; No. 4, $16.50%$16.75; No. 1 soft, $18; No. 2 soft, $17.50; gray forge, $15.75@$16; No. 2 foundry and No. 2 soft are rather scarce.

Cast-Iron Pipe.—Business continues good. Quotations are: $27.50 per net ton, carload lots at tidewater, for 6-in. pipe. Higher prices are expected.

Bars.—Business is good and prices higher. Iron bars are 1.795c., tidewater, for plain, and 1.845c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25c. the current price, but 2.50c. is probable soon.

Plates.—Steel plates are in strong demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. For early delivery premiums are asked, depending on the necessities of buyers.

Structural Material.—Small orders continue to come in freely, and deliveries uncertain. Prices are unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery.

Steel Rails.—No change in standard sections. Light rails are in demand and higher, prices ranging from $23.50 for 35-lb., up to $29 for 12-lb. rails.

Old Material.—Demand is strong, and prices are firm. No. 1 railroad wrought is $22@$23; No. 1 yard wrought, $20@$21; machinery cast, $14.50@$15; heavy steel cmelting scrap, $17@$18. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Nov. 1.

Pig Iron.—The oversold condition of almost every furnace in middle and eastern Pennsylvania accounts for the existing dullness in most lines of iron. On the other hand, there are inquiries for large lots of basic from consumers who have a great deal of uncovered work on hand. The bulk of our smaller consumers is doing very little at present in the way of contracting for material to cover work recently taken. The tone of the market is very strong and frequent remarks are made in the offices that an advance of 50c. per ton is about to be made. Quotations for No. 1X foundry are $18.25; No. 2X, $17.25; No. 2 plain, $17.25; gray forge, $16; basic, $17.50.

Billets.—Billets are quoted as high as $29 delivered. There is no small business in sight.

Bars.—Whatever the association may do as regarding the pending advance in steel bars, small buyers say that they cannot get anything like an accommodation unless they pay premium prices.

Pipes and Tubes.—The enormous activity in all those industries into which tubes enter is responsible for the payment of premiums on prompt deliveries.

Merchant Steel.—A good deal of merchant steel is being delivered to Eastern customers from the mills, but no new orders of consequence have been placed.

Skelp Iron.—There is quite a rush for skelp and all our mills are well supplied with business.

Plates.—The oversold condition of all our plate mills is responsible for the premium prices that are now gladly paid by everyone who needs plates.

Structural Material.—Orders for some 30,000 tons of structural material have been placed in Pennsylvania mills and additional orders will be placed before Saturday.

Steel Rails.—The reports from our steel offices today are that there is much more inquiry than can be comfortably provided for.

Old Rails.—Old iron rails are quoted at $23 and transactions have been closed which amount to an exchange of old iron rails for new steel rails.

Scrap.—The scramble for good scrap keeps up, and there is nothing in the city yards that deserves to be dignified by the name of stock. No. 1 steel scrap is $17.50; railroad, $22.50; machinery scrap $16.50, and phosphorus scrap $22.50.

Pittsburg. Oct. 31.

Sales of bessemer pig iron for the week aggregate fully 65,000 tons, and the supply for the year is practically cleaned up. One large independent furnace interest is said to be holding about 10,000 tons for a higher rate than has prevailed at any time during the year. Of the tonnage sold, the United States Steel Corporation obtained 45,000 tons at $16.50, Valley furnaces, for delivery in November and December, 20,000 tons going to W. P. Snyder & Co., and 25,000 to the Bessemer Pig Iron Association. The rest of the tonnage went to a number of different interests, and in some instances the price was $16.25. The Steel Corporation, it is understood, needs more outside iron than is available, and when it closed for 40,000 tons week before last at prices ranging from $15.50 to $16, it was figuring on buying from 75,000 to 100,000 for delivery during the rest of the year. A satisfactory price could not be agreed upon at the time, it is said, and as a result of the delay about 20,000 tons that might have been bought at the time went to other consumers. Furnace interests deny that any bessemer iron has been sold for delivery in the first quarter of next year, and also that the Steel Corporation has obtained options on a large tonnage. Under the existing conditions it is doubtful if an unhealthy advance in pig-iron prices can be avoided, and $19 or $20 may rule the rest of this year and in the first quarter of next year. It would not be particularly surprising if prices went to a higher point, as there is talk of an increase of about 50c. a ton for ore. Furnace coke for the first quarter cannot be bought at less than $3 a ton, and for delivery this year as high as $3.50 is being paid. The Southern furnaces are reported to have sold up for this year, and some are sold into the first half of next year.

The high prices for pig iron may interfere with the plans for preventing a runaway market in finished steel products. The demand in several of the important lines is enormous, but the established prices are unchanged. No sales are made, however, at the pool prices for billets, plates, merchant steel bars or structural material. Interests identified with the billet pool seem to have forgotten that the last "official" price named for both bessemer and open-hearth billets was $21. The only quotation for bessemer billets is $26, and there is very little to be had even at that figure. It is almost impossible to buy open-hearth billets at any price. The plate mills have contracts that will keep them running steadily all of next year. The Pressed Steel Car Co. has revised its tonnage arrangement with the Carnegie Steel Co., and, beginning Jan. 1, will take 65,000 tons monthly of rolled steel products, against about 45,000 tons monthly at present. The Standard Steel Car Co., the other large interest in this district, has also made provision for its plate requirements, but the affairs of this concern are seldom made public. It has received its share of the new car orders placed during the past month, and its large plant at Butler will be kept busy all of next year. The railroads are still placing orders for steel rails, and there is no doubt but that fully 3,000,000 tons will

be contracted for before the end of this year for delivery through 1906, and the capacity of the rail mills will be taxed to meet the requirements. The structural mills are sold up for this year, and a lot of work is being deferred until next year owing to inability to get material. The American Bridge Co. has just closed a contract for a bridge at Ironton, O., that will require 12,000 tons of steel.

The Republic Iron & Steel Co., the leading bar iron interest, has advanced the price of common iron bars $2 a ton to 1.80c., Youngstown, or 1.84¼c. Pittsburg, which is $6 a ton above the pool price for steel bars, 1.50c. Other producers, however, have not followed the advance. Premiums, however, are being obtained for small lots. The American Sheet & Tin Plate Co., has started a number of idle sheet and tin-plate mills, and next Monday will put more mills in operation. It is now running about 70% of its tin-plate mills and nearly 90% of its sheet mills.

Pig Iron.—The minimum price of bessemer iron has been firmly established at $16.50, Valley furnaces, or $17.35, Pittsburg. Foundry iron also has advanced, and several sales were made at prices ranging from $16.85 to $17.35, Pittsburg. Gray forge is still quoted at $15,85, Pittsburg, and there is not much demand.

Steel.—There is but little doing in billets on account of the scarcity. Plates are still in demand, and the price is unchanged at 1.60c., and merchant steel bars are still quoted at 1.50c.

Sheets.—Some independents have withdrawn from the market, and prices are likely to be advanced. Black sheets are still quoted at 2.30c., and galvanized at 3.30c. for No. 28 gauge.

Ferro-Manganese.—The market continues firm, and $62 a ton is the minimum price.

Cartagena, Spain. Oct. 14.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were one cargo, 4,000 tons manganiferous ore, to Great Britain.

There is a continued demand for ore of all classes, and prices are ruling considerably higher than they were a few weeks ago. Steamers are, however, scarce and freights firm, so that stocks are accumulating, but there is very little ore cut that has not been already sold for forward shipment.

Quotations for iron ores have advanced. Ordinary 50% ore is 7s. 6d.@7s. 10d.; special low phosphorus, 8s. 2d.@8s. 6d.; specular ore, 58% iron, 11s.; S. P. Campanil, 9s. 6d. per ton. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 3d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

Heavy Chemicals and Minerals.

NEW YORK, Nov. 1.

The prices for heavy chemicals hold their general strength, with a stronger tone of market for several products. American sulphur is firm on the basis of adjustment as outlined in a recent issue; we note herewith the prices for the American product, most of which is delivered at New York and Portland. The Louisiana product is already disposed of, under contract, for a long time in advance. Sicilian is quoted the same for Atlantic ports as the Louisiana sulphur.

Pyrite continues unchanged and in steady demand, the supply being practically disposed of, for several months in advance, mostly to the regular acid-makers.

Nitrate of soda reports the same prices as in the advances noted recently, with a market which continues very strong.

Phosphate companies report a peculiar situation which amounts to parted relations between seller and buyer, on account of the strained freights. For this reason the sellers seem unwilling to place any large sales, preferring to wait for the higher prices, which are not expected immediately, but only as a coming probability that may not materialize for some time. Actual prices show but little change from last week.

Foreign Chemical Trade.—Imports of heavy chemicals into the United States for the nine months ending Sept. 30 are reported by the Bureau of Statistics as below, in pounds:

	1904.	1905.
Bleaching powder	65,869,626	75,943,012
Potash muriate	82,289,156	118,550,028
Potash chlorate	83,427	20,631
Potash nitrate	10,151,659	8,403,493
Other potash salts	46,977,452	55,651,092
Caustic soda	1,846,533	1,604,575
Sal soda	3,840,528	947,437
Soda ash	15,021,656	10,852,457
Other soda salts	7,514,632	8,077,014

Nearly all the potash salts show increase. Most of the soda salts show decreases, which are largely the result of domestic competition. Imports of fertilizing chemicals were, in tons:

	1904.	1905.
Nitrate of soda	220,368	247,966
Phosphates	78,283	52,192

The increase in nitrate of soda was 27,598 tons, or 17.5%. The imports of sulphur and of pyrites, valued chiefly for sulphur contents, were as follows, in long tons:

	1904.	1905.
Sulphur	107,836	62,651
Pyrites	290,752	376,607

The decrease in sulphur was due to the increased production of sulphur in the United States.

Exports of phosphates and of chemicals from the United States for the nine months ending Sept. 30 are reported as follows:

	1904.	1905.
Phosphates, tons	671,929	743,475
Acetate of lime, lb	43,907,672	50,399,165
Copper sulphate	24,990,195	17,658,000

The more important exports of phosphates this year were: To Germany, 231,735 tons; Great Britain, 109,693; France, 80,533; Italy, 109,239 tons. The acetate of lime goes to Germany. Copper sulphate shows a large decrease from last year, but was about the same as in 1903.

Bauxite.—As already anticipated unofficially, the absorption of the General Bauxite Co. by the Pittsburg Reduction Co. has been consummated. The General Bauxite Co. operated bauxite deposits in Saline county, Ark., and also in the Georgia-Alabama region, its head office being at Perry-Smith, Ark. The Pittsburg Reduction Co., which has a monopoly of the aluminum-smelting industry in this country, whose bauxite reduction plants are at Pittsburg and East St. Louis, obtained its supply of crude ore from its mines in Saline county, Ark., although it also secured refined alumina from other sources.

In the course of the consolidation, the principal holdings in the General Bauxite Co. were acquired by the General Chemical Co., which then transferred them to the Pittsburg Reduction Co. As a rule, the Georgia-Alabama bauxite has been devoted to the chemical trade, while the Arkansas product has supplied the ore for aluminum reduction. This entry of the Pittsburg Co. into the Southern field may thus evidence an intention of participating more largely in supplying the chemical trade.

PRICES.

Sulphur.	
Louisiana, N. Y., Boston or Portland ton	$22.125
Philadelphia or Baltimore "	22 625
Pyrite.	
Domestic, furnace size Unit	11c
Fines "	10c.
Imported, lump, At. ports "	10@11c.
" fines " " "	9½@10c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Acids.	
Boric, crystals per lb.	.10
powdered "	.10½
Carbonic, liquid gas "	.12½
Hydrofluoric, 30% "	.03
48% "	.05
60% "	.11
Nitric acid, 36°, 100 lb.	$4.75
38°, 100 lb.	5.25
40°, 100 lb.	5.50
42°, 100 lb.	5.75
Oxalic acid, com'l, 100 lb.	$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton	13.50@14 50
60°, 100 lb. in carboys	1.05
60°, bulk, ton	18 00@20.00
66°, 100 lb. in carboys	1.20
66°, bulk ton	21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb.	$5.35
Nitrate of Soda, 100 lb.	2.25@ 2.30
Sulphate of Ammonia, per 100 lb.	3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain§ or Europe.
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡So. Car. land rock	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr.	.....	11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C. §These figures are slightly higher owing to the advance (one-quarter penny) plus slightly higher freights

Metal Market.

New York, Nov. 1.

Gold and Silver Exports and Imports.

At all United States Ports in Sept. and Year.

Metal.	September		Year.	
	1904.	1905.	1904	1905.
Gold				
Exp	$2,744,448	$1,412,904	$83,039,908	$42,677,921
Imp	4,241,035	5,499,685	68,694,670	30,295,595
Exc	E. $1,496,587	I. $4,086,781	E.$14,345,238	E.$12,382,326
Silv.				
Exp	3,378,775	5,527,479	$9,129,920	$9,443,210
Imp	2,003,036	3,803,840	19 677,231	24,470,838
Exc	E. $1,375,739	E. $1,723,639	E.$19,453,689	$14,972,377

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce of Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending October 28, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$55,550	$97.123	$660,877	$72,251
1905.....	34,4 5,278	10,380,977	29,006,228	3,796,466
1904.....	76,474,103	5,337,535	31,112,395	877,651
1903.....	31,547,900	6,698,110	25,931,761	3,135,152

Exports of gold for the week were to the West Indies; of silver to Great Britain. Imports, both gold and silver, were from Mexico, Central and South America.

The statement of the New York banks —including all the banks represented in the Clearing House—for the week ending Oct. 28 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,142,286,600	$1,041,819,400
Deposits	1,294,434,200	1,042,092,300
Circulation	43,248,900	54,890,100
Specie	238,360,200	196,059,200
Legal tenders	79,542,000	76,894,800
Total reserve	$317,902,200	$272,954,000
Legal requirements	301,108,550	260,523,075
Balance surplus	$16,793,550	$12,430,925

Changes for the week this year were increases of $15,129,300 in loans, $2,897,900 in specie, $1,508,100 in legal tenders, $18,232,900 in deposits and $209,600 in circulation; a decrease of $152,225 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$196,059,200	.....
England	159,617,625	.....
France	583,149,995	$218,812,280
Germany	156,455,000	52,150,000
Spain	74,845,000	112,345,000
Netherlands	32,995,500	29,815,500
Belgium	16,220,000	8,110.000
Italy	124,500,000	15,835,500
Russia	576,850,000	21,620,000
Austria	227,705,000	60,275,000

The returns of the Associated Banks of New York are of date Oct. 28, and the others Oct. 27. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Oct. 19 are as follows:

	1904.	1905.	Changes.
India	£8,059,398	£4,835,921	D. £3,223,477
China	372,722	784,246	I. 411,524
Straits	58,103	38,299	D. 19,804
Totals	£8,490,223	£5,658,466	D. £2,831,757

Receipts for the week were £4,000 from the West Indies and £156,000 from New York; a total of £160,000. Exports were £80,700 to Bombay and £25,558 to Hongkong; £106,258 in all.

Indian exchange continues firm. Although the amount offered was increased, all the Council bills put out in London were taken at an average of 16.05d. per rupee. It is reported in London that the Indian government is again buying silver for coinage.

The strong demand for money in Europe has resulted in the calling of money loaned here. This, with an unexpected scarcity of cotton bills, has sent foreign exchange up sharply. It is quite possible that the movement of a few weeks ago will be reversed, and that gold will be shipped from New York to London.

The movement of gold in Great Britain for the nine months ending Sept. 30 is reported as follows:

	1904	1905
Imports	£24,771,950	£29,744,792
Exports	18 484,613	22,552,733
Excess imports	£6,287,337	£7,192,059

The increase in imports was £4,972,842, but the gain in net gold received was only £904,722, owing to larger exports.

The movement of silver for the nine months is reported as follows:

	1904	1905
Exports	£10,254,439	£10,648,137
Imports	9,342,875	9,784,853
Excess exports	£911,564	£863,284

The decrease in the net exoprts was £48,280. Of the imports this year a total of £7,118,162, or 66.8% of the whole, was from the United States.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.47	$0.49
Peruvian soles and Chilean pesos	.43	.45
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

SILVER AND STERLING EXCHANGE.

Oct.	Sterling Exchange.	Silver New York, Cents.	Silver London, Pence.	Oct.-Nov.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
26	4.86⅛	62⅛	28⅞	30	4.8690	62⅛	28⅞
27	4.86⅛	62⅛	28⅛	31	4.86⅛	62⅛	28⅝
28	4 87	62⅛	28⅝	1	4.8670	62⅛	28⅛

New York quotations are for fine silver, per ounce, Troy. London prices are for sterling silver, .925 fine.

Other Metals.

Daily Prices of Metals in New York.

Oct.-Nov.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
26	16¼ @16½	16⅛ @16⅜	71½	32¾	4.85	6.15	6.00
27	16¼ @16½	16⅛ @16⅜	71⅜	32¾	4.85	6.15	6.00
28	16⅛ @16⅜	16⅛ @16⅜	....	32¾	4.85	6.15	6.00
30	16¼ @16½	16⅛ @16⅜	71⅝	33	4.85	6.15	6.00
31	16¼ @16⅜	16⅛ @16⅜	71¼	33	4.85	6.15	6.00
32	16¼ @16½	16⅛ @16⅜	71½	33	5.15	6.15	6.00

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic.

Copper.—The market has been quiet but steady throughout the week. Some orders have been placed for delivery into next year, but the business transacted has been of small proportions. It is reported that sellers are now pretty well booked up for shipment early next year, so that any material increase in the demand for that delivery is bound to bring about an advance in prices. The closing quotations are unchanged at 16¼@16½c. for Lake copper; 16⅛@16⅜c. for electrolytic in wirebars, cakes and ingots; 15⅝@16c. for casting copper.

The acute tension in the spot position of the standard market has relaxed somewhat, and while a backwardation still exists, the margin between spot and three months' copper has been reduced at the expense of the spot quotation. The closing is £71 10s. for spot, £70 10s. for three months.

Statistics for the second half of October show an increase in the visible supplies of 400 tons.

Refined and manufactured sorts we quote: English tough, £74; best selected, £75; strong sheets, £83; India sheets, £78; yellow metal, 7d.

Copper Exports and Imports.—Exports of metallic copper from the United States for the nine months ending Sept. 30 are reported by the Bureau of Statistics of the Department of Commerce and Industry as below; the figures given being in long tons, of 2,240 lb. each:

	1904.	1905.	Changes.
Great Britain	36,881	21,199	D. 15,682
Other Europe	140,037	128,099	D. 11,938
China	1,338	33 119	I. 31,781
Other countries	1,383	7,984	I. 6,601
Total	179,639	190,401	I. 10,762

To all countries outside of China there was a decrease of 21,019 tons; so that the gain this year was entirely in the Chinese business. In addition to the exports given above, there was exported this year 20,388 tons or ore and matte. The cop-

per contents of these exports are not given; estimating them, chiefly on the basis of values, and ading to the quantity of metal, we find that the total exports for the nine months were equivalent to 193,976 tons of fine copper.

Imports of copper and copper material into the United States for the nine months ending Sept. 30 are reported as follows, with re-exports of foreign material; the figures giving the equivalent of all material in long tons of fine copper:

	Metal.	In Ore, etc.	Total
Mexico	34,739	9,461	44,200
Canada	7,453	4,467	11,920
Great Britain	8,101	21	8,122
Other countries	2,808	1,664	4,472
Total	53,101	15,613	68,714
Re-exports	482	.....	482
Net imports	52,619	15,613	68,232

The total net imports were 124,744 tons less than the exports given above. The imports of ores and matte from Canada and Newfoundland were 123,693 tons, with a copper content of 4,407 tons; those from Mexico were 71,679 tons, with a copper content of 9,461 tons. The imports from Mexico include a large proportion of matte. The imports from Great Britain were largely bars sent here to be refined. Imports from other countries were chiefly from South America.

Exports of copper from New York for the week are reported at 2,638 tons. Our special correspondent gives the exports from Baltimore at 3,644 long tons of fine coppers.

Tin.—A very large business has been transacted during the week at advancing prices. It turns out that the supplies in this country have very much decreased and a premium is ruling on prompt deliveries. We quote at the close 32⅞@33⅛.

The London market has shown a great deal of strength and at one time touched £150 for spot and £149 for three months. At the close the market re-acted to £149 for spot and £148 7s. 6d. for three months.

Statistics for the month of October show a decrease in the visible supplies of 57 tons, and including the stocks in this country, the decrease is 1,700 tons.

Imports of tin into the United States for the nine months ending Sept. 30 were as follows, in long tons:

	1904.	1905.	Changes.
Straits	13,456	15,465	I. 2,109
Australia	247	424	I. 177
Great Britain	14,498	14,856	I. 358
Holland	469	320	D. 149
Other Europe	271	662	I. 391
Other countries	23	30	I. 7
Total	28,964	31,857	I. 2,893

Of the tin received from Great Britain, the larger part is Straits tin.

Lead.—The leading interest advanced its price at the close to 5.15 New York and 5.07½ St. Louis.

The foreign market has moved up further and closes firm at £14 18s. 9d. for Spanish and £15 1s. 3d. for English lead.

Imports of lead in all forms into the United States, with re-exports of imported metal, are given by the Bureau of Statistics as below, for the nine months ending Sept. 30, the figures being in short tons, of 2,000 lb.:

	1904.	1905.	Changes
Lead, metallic	7,017	3,166	D. 3,851
Lead in ores and base bullion	81,096	73,516	D. 7,580
Total imports	88,113	76,682	D. 11,431
Re-exports	67,768	64,275	D. 21,493
Net imports	20,345	30,407	I. 10,062

Of the imports this year, 66,838 tons were from Mexico, and 9,094 tons from Canada; the balance from other countries. Exports of domestic lead were 196 tons in 1904, and 221 tons in 1905; an increase of 25 tons.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead continues scarce as ever and prices are advancing almost daily. Latest sales are on a basis of 5.15c. East St. Louis, for Missouri brands.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Oct. 14 that silver has been 14.25 reales per oz. Exchange is 31.83 pesetas to £1. Pig lead is 76.25 reales per quintal; equal, on current exchange, to £13 8s. 2d. per long ton, f. o. b. Cartagena. Shipments for the week were 148 tons desilverized to Marseilles; 100 tons desilverized and 613 tons argentiferous lead to London.

Spelter.—The offerings of American spelter in Europe have had an unfavorable effect upon the market there, which in turn has reacted somewhat on the sentiment here, in so far as the two markets during the last few weeks have been interdependent. Business has fallen off somewhat, and prices close barely steady at 6.15 New York and 6c. St. Louis.

The decline in the London market has brought down the quotations at the close to £28 5s. for good ordinaries and £28 10s. for specials.

Exports of spelter from the United States for the nine months ending Sept. 30 were 5,729 short tons in 1904, and 2,456 tons in 1905; a decrease of 3,273 tons. Exports of zinc ore were 21,617 tons in 1904, and 15,256 tons in 1905; a decrease of 6,361 tons this year.

Zinc Sheets.—Sheet zinc is quoted at $7.50 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 to 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50. The demand is reported active.

Imports and exports of spelter in Germany for the eight months ending Aug. 31 were as follows, in metric tons:

	1904.	1905.	Changes.
Spelter	42,050	42,053	I. 3
Zinc sheets	11,222	11,645	I. 423
Scrap, etc.	2,801	3,170	I. 369
Total exports	56,073	56,868	I. 795
Imports	14,971	20,546	I. 5,575
Net exports	41,102	36,322	D. 4,780

Imports of zinc ore were 60,277 tons in 1904, and 82,095 tons in 1905; an increase of 21,818 tons. Exports of zinc-white were 12,325 tons in 1904, and 12,321 tons this year.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is very quiet. Latest sales here are an a basis of 6@6.02½c. East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Oct. 14, that prices are unchanged at 95 fr. per ton for blende, 35% zinc, and 72 fr. for calamine, 30% zinc. Mines are taking advantage of the high price of spelter and of competition to cut the lower class calamines, while a good deal of the poorer blende is being calcined, the cost being more than compensated for by the extra units obtained.

Antimony.—Such business as has been doing has been transacted at 11¼@12½c., depending upon brands.

Imports of antimony into the United States for the nine months ending Sept. 30 are reported as follows, in pounds:

	1904	1905	Changes.
Metal or regulus	2,707,854	3,527,904	I. 820,050
Antimony ore	1,598,675	1,399,730	D. 198,945

This shows an increase of 30.3% in metal and regulus; but a decrease of 12.4% in ore.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Exports of nickel, nickel oxide and nickel matte from the United States for the nine months ending Sept. 30 were 4,581,105 lb. in 1904, and 7,699,165 lb. in 1905; an increase of 3,118,060 lb. Imports of nickel ore and matte were 6,387 long tons in 1904, and 10,167 tons in 1905; an increase of 3,780 tons.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Imports of platinum into the United States for the nine months ending Sept. 30 were 5,442 lb. in 1904, and 5,412 lb. in 1905; a decrease of 30 lb. this year.

Quicksilver.—The market is quiet. The New York quotation is $40 per flask of 75 lb. for large orders, and $40.50@$41 for small lots. San Francisco prices hold steady at $39 for domestic orders, and $37.50@$38 for export business. The London market is unchanged, £7 2s. 6d. being quoted both by first hands and jobbers.

Exports of quicksilver from the United States for the nine months ending Sept. 30 were 1,315,423 lb. in 1904, and 815,257 lb. in 1905; showing a decrease of 500,166 lb. this year.

Manganese Alloys.—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn	275
No. 2, 28% Mn	180
No. 3, 20 to 25%, with 2 to 4% iron	165
Manganese tin, No. 1, 55% Mn., no iron	400
No. 2, 56% Mn., some iron	280
Manganese nickel, No. 1, free from iron	450
No. 2, traces of iron	270

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.)	40c.
Thallium, f. o. b. Breslau, Germany.	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Missouri Ore Market.

JOPLIN, Oct. 28.

The highest price paid for zinc was $54 per ton for three bins of extra select ore. The assay basis price ranged from $49 to $52 per ton of 60% zinc. The bear movement of a few weeks back succumbed upon the invasion of one of the smelters with an advance of $1 per ton at the close of last week, a movement that was followed by advances by all the smelters this week. While prices were advanced and the demand brisk, yet it was not equal to the output, and the stock on hand was augmented approximately 400 tons.

Lead ore advanced $2 per ton, choice bins selling at $66.50 per ton, the highest price since the civil war. When the Corwin syndicate and the lead trust were competing for control of the lead business in the United States 14 years ago, the price of lead ore reached $65 per ton for one week; this was followed by the failure of the syndicate and Baring Brothers, of London, backers of the movement to corner the lead market.

Though the general advance on zinc was approximately $2 per ton, a decrease in the shipment of silicate ore and low-grade zinc ore shows the average price to be $45.56, an advance of $3.46 per ton. The average price for lead was $65.90, an advance of $2.30 per ton.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,958,580	197,150	$78,990
Carterville-Webb City	1,696,670	607,910	59,080
Duenweg	951,000	205,410	28,650
Galena-Empire	761,430	183,880	23,210
Aurora	819,200	.....	14,690
Neck City	493,300	.....	12,570
Granby	565,000	43,000	10,440
Baxter Springs	355,600	47,490	9,570
Oronogo	295,600	28,000	7,940
Alba	263,790	.....	6,720
Badger	257,620	.....	6,050
Prosperity	147,910	67,570	5,620
Carthage	127 490	.....	3,250
Sherwood	83,990	5,670	2,160
Spurgeon	42,020	.....	880
Beef Branch	40,130	9,580	810
Totals	9,859,350	1,394,650	$270,630
43 weeks	416,582,450	51,205,500	$10,854,925
Zinc value, the week, $224,665; 43 weeks, $9,328,900			
Lead value, the week, 45,965; 43 weeks, 1,526,025			

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61 50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July.	33.37	43.00	July.	53.00	58.00
August	37.55	48.83	August	53.00	58.00
September.	40.18	46.75	September.	53 50	63.50
October	43.65	47.60	October	53.50	63.86

Wisconsin Ore Market.

PLATTEVILLE, Oct. 28.

The market conditions are highly favorable to the producer. As usual, the roasted ore set the price, the basis for 60% zinc concentrates being $49.50. One or two large batches sold for $51. The buyers are gradually raising the price of the low-grade ores to a point where it is a question in some instances whether it pays to roast the ore. This is all the producers could desire. The Phœnix people received $40 for their ore, as against $35 per ton for the last car they sold. Lead ore is selling at $30 per 1,000 lb., supplies not being large.

Mining Stocks.

New York. Nov. 1.

The stock market continues largely professional and fluctuations have been in both directions. It has been affected by the high rates for money, and by the depression abroad resulting from the disturbances in Russia. The latest turn, today, is upward.

Copper stocks have been strong. Amalgamated closes at $84. United Copper sold at $33½@$34 for the common, and $75½ for the preferred; Utah Copper, $27¾. On the Consolidated Exchange there were light dealings in the Comstocks and some activity in Tonopahs. Portland, of Cripple Creek, sold at $2.10. Standard Consolidated, of California, which has been quiet for some time, showed sales of 700 shares at $1.95@$2. The industrials were strong.

Official announcement is made that the Federal Mining & Smelting Co. will issue $3,000,000 of new stock, $2,000,000 of which will be preferred and $1,000,000 common, the proceeds to be used for the purchase of the Morning and Youlike groups of silver-lead mines, for which $3,000,000 cash was paid. These mines are situated near Mullan, in the Cœur d'Alene district, Idaho. A syndicate has underwritten the whole issue of new stock. Holders of the preferred and common stocks of the company of record Nov. 15 next will have the right to subscribe for the new stock in proportion to their holdings, provided that subscriptions are made on or before Nov. 17. Each holder of 100 shares of either class of stock will be entitled to subscribe for 13⅓ shares of new preferred stock and for 6⅔ shares of new common stock.

Boston. Oct. 31.

The week has been characterized by heavy sales in some of the Lake copper stocks, at prices which have not, on the whole, been sustained at the high figures recorded last week. North Butte, of Montana, in particular, has seen large sales, at around $56.50. Tecumseh has advanced 75c. to $14 and Copper Range has held its own at around $14.75, while Allouez has gained a little to $45. Most of the other Lake companies have fallen off by greater or less amounts within the week: Atlantic by 75c. to $26.50, a total falling off of $2 within two weeks; Calumet & Hecla from its boom price of $685 a week ago has receded to $683; Centennial by $2.25 to $31.875; Osceola by $3.50 to $111.50; and Wolverine, which reached a record figure at $129 a week ago, is now selling at $126. Mohawk, Franklin and Old Dominion also suffered declines. Old Dominion announces a dividend of 50c. payable Dec. 15, but shares have declined from $31.25 to $30.25 in the week. United Copper with a $3 dividend announced for Nov. 15, is selling at $33.25. Arcadian and Shannon

have seen considerable activity since a week ago.

Colorado Springs. Oct. 27.

The market has been a fraction lower than one week ago, with trading rather light in all Cripple Creek stocks. Most stocks in the mines list are selling lower than one week ago. El Paso has taken another drop and has tumbled from 74 to 64c., with trading rather light. Elkton has also shaded off a fraction and sold on today's market for 51½c. Findley has dropped about 1c. and selling for 82½c. Portland sold down during the week from $2.20 to $2.12. Isabella is selling now for 26c.; Vindicator for 75c; United Gold Mines for 15½c.; Independence for 10½c. per share.

San Francisco. Oct. 26.

Buying orders have been more plentiful, and prices consequently firmer. Ophir sold up to $5.75; Consolidated California & Virginia, $1.85.

The Tonopahs were active and strong, Montana Tonopah selling at $2.30, while $1.40 was paid for Tonopah Midway.

In oil stocks there was very little business doing, and few changes in price.

Dividends.

Company.	Payable.	Rate.	Amt.
Alaska Mexican	Oct. 28	$0.30	$54,000
Alaska Treadwell	Oct. 28	1.00	200,000
Amalgamated Copper	Nov. 27	1.25	1,937,500
Bunker Hill & Sullivan	Nov. 4	0.60	180,000
Bethlehem Steel, pf	Nov. 1	1.75	262,500
Green Con. Copper	Oct. 30	0.40	345,600
Homestake Gold	Oct. 25	0.50	109,200
Le Roi No. 2	Oct. 30	0.24	28,800
New Central Coal	N v. 1	0.40	20,000
Old Dominion	Dec. 15	0.50	144,000
Penna. Steel, pf	Nov. 1	3.50	577,500
Philadelphia Co.	Nov. 1	0.75	434,295
Portland Gold		0.10	300,000
Rocco-Homestake	Nov. 25	0.02	6,000
St. Eugene Con	Oct. 30	0.02	64,040
Tenn. Coal Iron & R. R.	Nov. 1	1.00	225,536
Tenn. Coal, Iron & R. R., pf.	Nov. 1	2.00	4,960
U. S. Cast Iron Pipe & Fdy.	Dec. 1	1.00	128,000
Vindicator		0.03	33,000
United Copper, pfd	Nov. 15	3.00	150,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt,
Caledonia	Nov. 17	Dec. 8	$0.01
Confidence	Nov. 12	Dec. 4	0.20
Crown Point	Nov. 14	Dec. 5	0.10
Dudley, Cal	Oct. 30	.....	0.01
Exchequer	Oct. 10	Oct. 31	0.05
Hale & Norcross	Nov. 2	Nov. 28	0.10
Heywood, Nev.	Oct. 31	.....	0.05
Justice	Nov. 16	Dec. 9	0.05
Mexican	Oct. 30	Nov. 20	0.15
Savage	Nov. 8	Nov. 29	0.10
Sierra Nevada	Nov. 2	Nov. 23	0.10
Union Con	Nov. 13	Dec. 4	0.10
Utah Con., Nevada	Oct. 31	Nov. 21	0.05
Yellow Jacket	Oct. 17	Nov. 22	0.10

LONDON. (*By Cable.**) Nov. 1

	£	s.	d.
Camp Bird	1	15	0
Consolidated Gold Fields	6	5	0
De Beers	17	17	6
Dolores	2	0	0
East Rand	6	15	0
El Oro	1	15	7½
Esperanza	5	2	6
Modderfontein	8	3	9
Rand Mines	8	0	0
Rio Tinto	66	17	6
Simmer and Jack	1	10	0
Stratton's Independence	6	9	0
Tomboy	1	10	7½

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Nov. 1.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	86	81⅛	84	157,450
Anaconda	120¼	116¾	119¾	6,600
British Col. Copper	8¾	7⅞	8⅜	8,125
Federal	120½	119	119	900
Federal, Pf.	99⅜	96	98	9,950
Greene Copper	27	26⅛	26⅜	16,150
Greene Gold	5⅛	4⅜	4¾	4,510
Mitchell	8½	8	8⅛	4,800
Tennessee Copper	34½	33½	34	500
Union Copper	1 6/16	1 3/16	1¼	3,300
United Copper,	34⅜	33	33⅞	14,300
United Copper, Pref.	76½	74	75⅛	1,327

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	139¾	129⅝	139	361,160
Am. Smelting & Ref., Pf.	125¼	121	124½	12,290
Colorado Fuel & Iron	45¾	43½	45¼	32,150
National Lead	52⅛	46¼	52⅛	93,150
Pittsburg Coal	15⅛	15⅛	15⅛	200
Republic I. & S.	26⅞	24¾	25⅞	17,050
Republic I. & S., Pf.	97¼	94⅜	95⅜	10,800
Tenn. C. & I.	92¼	86	91⅜	63,600
U. S. Red. & Ref.	30¼	27½	29¼	3,800
U. S. Red. & Ref., Pf.	72¼	68⅛	69	5,800
U. S. Steel	39	37	38½	339,620
U. S. Steel, Pf.	105½	104	105⅛	97,418
Bethlehem Steel	30	28	28	217
Standard Oil	703	671	703	1,372

BOSTON.

Allouez	46⅛	42½	45	12,088
*Amalgamated	86	81	84	14,936
Atlantic	27½	24½	26¼	6,587
Bingham	32	30¾	31⅜	1,593
Boston Consolidated	14¾	11¼	14½	58,104
Calumet & Hecla	685	680	684	31
†Centennial	34	30½	32	16,460
Mercur	.64	.59	.63	6,890
Copper Range	75⅝	72¾	74½	27,543
Daly-West	14⅛	13¾	14	1,115
Franklin	19½	17⅜	17⅞	3,847
Granby	9⅜	8¾	9⅛	7,435
*Green Con. Copper	27¼	26	26¾	5,805
Isle Royale	27⅛	25	26¾	13,506
†Mass	11⅜	9⅛	10¼	740
Michigan	15	14	15	980
Mohawk	60	58	59⅜	1,863
North Butte	58¼	56½	57¼	30,851
Old Dominion	32	29¾	30½	600
Osceola	114	110½	112¾	1,973
Parrot	27½	26¾	27	600
Quincy	107½	105	107	226
Phoenix	2	1⅛	1⅞	2,125
Rhode Island	8⅜	7½	8	4,807
Shannon	8¾	7½	8	7,523
Tamarack	130	128	130	50
Tecumseh	15⅜	13½	14½	11,154
United Copper, com	34¼	33	33¾	7,113
United States	36	34¼	35½	5,808
Utah	47¼	46¼	46⅞	1,755
Wolverine	126	126	126	267

PHILADELPHIA.

Cambria Steel	29¼	28⅛	28⅞	3,027
Philadelphia C	49	48⅛	48⅝	1,049
Tonopah	12⅝	12½	12⅝	1,049

PITTSBURG.

Crucible Steel	13½	13⅛	13¾	735
Crucible Steel, Pref.	67½	66⅞	66⅞	553
Tonopah Ext.	6.00	6.00	6.00	665

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	51	51¼	50⅛	50⅛
El Paso	69	69	63¼	63½
Isabella	26½	26½	25½	25¾
Portland	213	215	210	210
Vindicator	78	78	70	70

SAN FRANCISCO.

Best & Belcher	1.55	1.65	1.45	1.45
Bullion	.37	.38	.37	.38
Caledonia	.44	.46	.42	.42
Confidence	.75	.75	.75	.75
Con. Cal. & Va	1.80	1.80	1.70	1.90
Gould & Curry	.25	.25	.22	.22
Hale & Norcross	1.20	1.25	1.15	1.25
Mexican	1.35	1.45	1.35	1.45
Occidental Con	.87	.87	.87	.87
Ophir	5.75	5.87	5.50	5.50
Savage	.51	.51	.48	.51

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	62.034	26.760	28.637
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct	12.993	16.279	13.118	16.332	60.012	71.406
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31.760
Feb.	28.087	29.262	August	27.012	32.866
Mar.	28.317	29.523	Sept.	27.780	32.095
April	28.132	30.525	Oct	28.596	32.481
May	27.718	30.049	Nov.	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.565
Mar	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct	4.200	4.850
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	6.087	5.033	5.934	28.225
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

DIVIDENDS.

Gold, Silver, Lead, Quicksilver and Zinc Companies—U. S.

Name of Company and Location.		Authorized Capital	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1 000,000	180.000	5	$1.185,381	July 1905	$ .30
Alaska Treadwell,g	Al'ka	5,000.000	200,000	25	7,860 000	July 1905	1.00
Amalgamated, c,..	Mont	155,000,000	1,530,879	100	30,807,629	Aug. 1905	1.25
Am.Sm.&Ref.,com.	U. S.	50,000,000	500.000	100	5 250 000	Oct. 1905	1.75
Am. Sm & Ref. pf..	U. S.	50,000 000	500.000	100	19,391.553	Oct. 1905	1.75
Am. Smelters, pf. A		17,000,000	170,000	100	255,000	Sept. 1905	1.50
Am. Smelters. pf. B		30,000,000	300.000	100	375,000	Sept. 1905	1.25
Anaconda,c	Mont	30 000,000	1,200,000	25	26,850,000	Oct. 1905	1.25
Annie Laurie, g.	Utah	5,000,000	25,000	100	465,061	July 1905	.50
Arizona, c	Ariz	3,775 000	.....	....	6,186,826	Apr. 1905	.....
Atlantic, c	Mich	2,500,000	10.000	25	990,000	Feb. 1905	.02
B. & H., l z	Mo	400,000	400,000	1	36,000	Oct. 1905	.01
Boston & Montana.	Mont	3 750,000	150.000	25	43 025,000	July 1905	10.00
Bunker Hill & Sull.	Ida	3,000,000	300 000	10	5 226,000	Oct. 1905	.60
Butte & Boston, c..	Mont	2 500,000	200,000	25	1.80.,000	Feb. 1904	1.00
Calumet & Arizonac	Ariz	2 500,000	200,000	10	2.900 000	Sept. 1905	2.00
Calumet & Hecla,c.	Mich	2,500,000	10 0,000	25	90,850,000	Sept. 1905	10.00
Camp Bird, g.	Colo	5,500,000	820 000	5	2,050,104	May 1905	.18
Center Creek, l. z..	Mo.	1.000 000	10 000	10	170 000	Oct. 1904	.10
Central Eureka, g..	Cal	4 000,000	400 000	10	643,159	July 1905	.07
Century, g. s. l.	Utah	150.000	150,000	1	30,000	July 1904	.02
C. K. & N.,g	Colo	1 500,000	1,431,900	1	229,104	Dec. 1904	.01
Continental, z	Mo.	550,000	22 000	25	121 000	July 1905	.50
Copper Range	Mich	2,500,000	100,000	25	150 000	Oct. 1905	1 50
Copper Range Con.	Mich	38 500 000	383 781	100	1,101,343	Sept. 1905	1.00
Creede United, g..	Colo.	1,625.000	1,625,000	1	173,428	July 1905	.02
Cripple Creek Con g	Colo.	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly West, g. s. l ..	Utah	3,600.000	180 000	20	4.859,000	Sept. 1905	.60
De Lamar, g. s	Ida	400 000	67.180	5	2,926,370	May 1905	.72
Dillon, g	Colo.	1,250,000	1,250,000	1	21,875	July 1905	.01
Doe Run, l.	Mo.	1,500,000	15,000	100	752,072	Apr. 1905	1.50
Dutchess, g	Colo.	1.000 000	1.000,000	1	20.419	Feb. 1904	.01
Elkton Con., g.	Colo.	3 000,000	2,500 000	1	1,491 961	May 1905	.00½
El Paso, g	Colo.	2.500,000	2 450,000	1	975,250	Oct. 1905	.01
Fed. Sm., com.	Idaho	10 000.000	50 000	100	603 750	Sept. 1905	2.50
Federal Sm., pf.	Idaho	20,000 000	100,000	100	1,426 250	Sept. 1905	1.75
Findley, g	Colo.	1,250,000	1,250 000	1	50,000	May 1905	.01
Gemini-Keystone ..	Utah	500,000	5 000	100	1.300,000	Aug. 1905	10.00
Gold King Con	Colo.	5.750 370	5,750.370	1	1,407 504	May 1905	.01
Gold Sovereign	Colo.	2,000 000	2,000,000	1	10 000	Jan. 1905	.00½
Grand Central, g.	Utah	250,000	250.000	1	1.031 250	Aug. 1905	.05
Hecla, s. l.	Idaho	250 000	1 000.000	25	350 000	Apr. 1905	.01
Homestake, g	S. D	21 840,000	218.400	100	13,787,350	Aug. 1905	.50
HornSilver,g.s.c.z.l	Utah	10,000 000	400,000	25	5,462 000	Mar. 1905	.05
Iron Silver	Colo.	10.000,000	500,000	20	3,350,000	Sept. 1905	.10
Jamison, g	Cal	3 900 000	390,000	10	202,100	July 1905	.03
Jerry Johnson.	Cal	2,5o0,000	2,500,000	1	25,000	July 1905	.01
Kendall, g	Mont	2,500.000	500 000	5	780 000	July 1905	.05
Lib erty Bell, g.	Colo.	700.000	130,349	1	169,441	Oct. 1904	.15
Lightner, g	Cal	125,000	102,255	1	295.694	Aug. 1905	.05
Lucky Budge, z	Mo.	40,000	400	100	46,800	Apr. 1905	12.00
Lyon, z. l	Mo.	50 000	4.585	10	2 117	Jan. 1905	.20
Mammoth, g. s. l.	Utah	10 000 000	400,000	25	1,980 000	Nov. 1904	.05
Mary McKinney, g.	Colo.	1 000,000	1.000,000	1	567,000	Oct. 1904	.03
Mines Co. of Am	U. S.	2,000,000	2,000,000	1	1,065,000	Aug. 1905	.01½
Mont. Ore Purch..	Mont	2,500 000	81.000	25	4,104 000	May 1905	4.00
Monument, g	Colo.	300,000	300.000	1	27,124	Apr. 1905	.01
Nat'l Lead, pf	U. S.	15 000 000	149 040	100	14,346 780	Sept. 1905	1.75
Nevada Keystone, g	Nevada	1,000,000	638 877	1	61,790	Feb. 1904	.03
New Century. z	Mo.	150,000	150,000	1	21.60	July 1905	.02
New Idria, q	Cal	500 000	100,000	5	780,000	Oct. 1905	.20
New Jersey, z	U. S.	10,000,000	100,000	100	8,100,000	Aug. 1905	3.00
North Butte	Mont	.....	.....	...	400,000	Sept. 1905	.50
North Star, g	Cal	2,500 000	250,000	10	931.356	July 1905	.30
Northern Light,g s	Utah	2,000,000	400,000	5	20,000	Feb. 1904	.05
Old Gold	Colo.	2.101.150	2 101 150	1	10,506	Mar. 1904	.05
Ophir, g. s	Nevada	302,400	100.800	3	1,797.400	July 1904	.25
Osceola, c	Mich	2,500.000	96.150	25	4,821.200	July 1905	2.00
Oustomah, g	Cal	250,000	250,000	1	12,500	Mar. 1904	.05
Parrot, c,s	Mont	2,300,000	229,850	10	6,347,950	Sept. 1905	.50
Peacock Valley, l. z.	Mo.	25,000	2,500	10	47,50	May 1905	.....
Pennsylvania, g.	Cal	5,150,000	51,500	100	284.925	July 1905	.10
Penn-Wyoming	Wyo.	10,000,000	10000000	1	50,000	July 1905	.01½
Platteville, l. z.	Wis.	20 000	500	40	89,50	Oct. 1905	10.00
Portland, g	Colo.	3,000,000	3,000,000	1	6,157.080	July 1905	.10
Quicksilver, pf.	Cal	4,500,000	43,000	100	1,931.411	May 1903	.50
Quilp, g	Wash	1 500 000	1,500,000	1	15 000	Apr. 1904	.01
Quincy, c	Mich	2,500,000	100,000	25	15,220 000	Aug. 1905	3.00
Red Bird, g s c l..	Mont	1,500,000	300,000	5	72,000	Dec. 1904	.01
Rob Roy, z	Mo.	15,000	14,325	1	3,375	Dec. 1904	.03
Rocco Homest'k,l.s.	Nevada	300,000	300.000	1	100,000	Oct. 1905	.02
Sacramento, g	Utah	5,000,000	1,000,000	5	213,000	Aug. 1904	.01½
Salvator, g. s l.	Utah	200 000	200,000	1	6.500	Aug. 1904	.01
St. Joseph, l.	Mo.	6,000,000	375 000	10	4,059,500	Dec. 1904	.15
Silver Hill, g. s	Nevada	180,000	180 000	1	55 800	Aug. 1905	.05
Silver King, g. s. l.	Utah	3.000,000	150,000	20	9,250 000	July 1905	.66⅔
South Swansea, g.s.	Utah	300,000	300 000	1	170 500	Apr. 1904	.01
Spearfish. g	S. D.	1,500.000	1.500.000	1	165 500	Jan. 1905	.01½
Standard Con., g. s.	Cal	2,000,000	178,394	1	4,160,331	Sept. 1903	.10
Stratton'sIndepend	Colo.	5.500.000	1,000 007	10	4 505.863	May 1905	.12½
Tamarack, c	Mich	1 500 000	60,000	5	8,700,000	July 1905	2.00
Tennessee, c	Tenn	5,000,000	175 000	25	437,500	Jan. 1904	1.25
Tomboy, g. s	Colo.	1,500,000	300,000	25	1,316 000	Dec. 1904	.24
Tonopah of Nev.	Nevada	1,000,000	1,000,000	5	750,000	Oct. 1905	.25
Tonopah Ext'nsion	Nevada	1,000,000	1,0 0,000	1	.....	Oct. 1905	.10
Uncle Sam	Utah	200.000	200 000	1	75 000	July 1905	.01
United Cop., Com.	Mont	45,000,000	450,000	100	450,000	July 1905	1.00
United, c. pf	Mont	5 000,000	50 000	100	1,050,000	Nov. 1905	3.00
United, z. l , com	Mo.	5,000,000	92,400	5	27,450	Oct. 1903	.05
United, z. l., pf	Mo.	1,000,000	19 556	25	197,084	July 1905	.50
United (Crip'le C'k)	Colo.	5,000 000	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,000	300.000	10	17,085.322	Dec. 1904	.75
United States,g.s.c.	Utah	21 500,000	480,000	25	780.000	July 1905	.75
Utah, g	Utah	1,000 000	100,000	10	225 000	June 1904	.01
Utah Con., c.	Utah	1,500.000	300,000	5	3,636.000	July 1905	2.00
Victoria, Utah	Utah	250,000	250,000	1	17,500	Aug. 1905	.04
Vindicator Con., g.	Colo.	1 500,000	1 100,000	1	1.335,000	Oct. 1905	.03
Wash No. 2, g	S. D.	500 000	147.900	1	234 679	June 1904	.03
Wolverine, c.	Mich	1,500,000	60,000	25	2,790,000	Oct. 1905	6.00
Work, g	Colo.	1,500,000	1,500,000	1	15,000	May 1905	.00½
Yankee Con	Utah	500,000	500,000	1	160 000	Aug. 1905	.05
Yellow Aster, g.	Cal	1,000,000	100,000	10	538,789	Feb. 1904	.15

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Authorized Capital.	Shares. Issued.	Par Val. $	Dividends. Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf..	Ala	$2,500.000	$24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf	U S	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Alma Oil	Cal	400,000	400,000	1	57,600	Nov. 1904	.03
Amer. Ag. Chem., pf.	U. S	20,000,000	181,350	100	6,286,790	Apr. 1905	3.00
American Cement	Pa.	2,000,000	200,000	10	820,000	July 1905	.30
American Coal	Md	1,500,000	50,000	25	1,682,500	Sept. 1905	1.25
Associated Oil	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bon Air C. & I., pf.	Tenn	2,500,000	18,803	100	249,757	Oct. 1904	1.50
Cambria Steel	Pa.	50,000,000	900,000	50	9,150,000	Aug. 1905	.75
Caribou Oil	Cal	100.000	80,000	1	56,000	July 1905	.07
Central C & C., com.	Mo	5,125,000	51,250	100	1,166,250	Oct. 1905	1.50
Central C. & C., pf.	Mo	1,875,000	18,750	100	984,370	Oct. 1905	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil	Cal	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C & I	Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidated Coal.	Md	10,250,000	102,500	100	7,356,650	Feb. 1905	4.00
Empire S & I., pf.	N. J	5,000,000	23,700	100	498,000	July 1905	1.50
Esperanza Oil	Cal	125,000	125,000	1	2,500	Oct. 1904	.01
Fairmont Coal,	W. Va.	12,000,000	120,000	100	600,000	Feb. 1905	3.00
Four Oil	Cal	500,000	300,000	1	105,406	July 1905	.01
General Chem. com.	U. S.	12,500,000	74,103	100	1,300,507	Dec. 1903	1.25
General Chem., pf.	U. S.	12,500,000	100,000	100	3,625,178	Oct. 1905	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Home Oil	Cal	100,000	100,000	1	507,500	Oct. 1904	.02½
Ill. Crude Oil	Cal	200,000	200,000	1	12,500	Dec. 1904	.01½
Imperial Oil	Cal	1,000,000	100,000	100	880,000	July 1905	.20
Jeff & Cl'f C. & I., com.	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I.,pf	Pa.	1,500,000	15,000	100	750,500	Aug. 1905	2.50
Keystone Oil	Colo	2,000,000	2,000,000	1	8,000	July 1904	.00⅔
Kern River Oil	Cal	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	14,345,650	346,897	50	22,839,509	May 1905	2.00
Maryland Coal,pf.	Md	2,000,000	18,850	100	1,282,335	June 1905	3.50
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	2,960,945	Jan. 1905	.77
Monte Cristo Oil	Cal	500,000	500,000	1	120,000	July 1905	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1905	1.75
New Central Coal	Md	1,000,000	50,000	20	290,000	May 1904	.40
Oil City Petroleum	Cal	500,000	500,000	1	55,000	July 1905	.00½
Pacific Coast Borax	Cal	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil	al	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt	Pa.	3,000,000	60,000	50	13,988,000	Oct. 1905	3.00
Penna. Steel	Pa.	25,000,000	168,214	100	5,271,997	May 1905	3.50
Phila. Gas, com	Pa.	28,953,029	579,061	50	6,684,142	Nov. 1905	.75
Phila. Gas, pf.	Pa.	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	347,500	Aug. 1905	1.50
Republic I. & S., pfd		.....	204,169	100	436,369	Oct. 1905	1.75
Sloss-Sheffield, com.	Ala	7,500,000	75,000	100	375,250	Oct. 1905	2.50
Sloss-Sheffield, pf.	Ala	20,000,000	67,000	100	2,556,750	Oct. 1905	1.75
Somerset Coal	Pa.	4,000,000	40,000	100	80,000	Feb. 1904	2.00
Standard Oil	U. S.	100,000,000	970,000	100	270,735,000	Sept. 1905	6.00
Tenn. C. & I., com	Tenn	22,553,600	225,536	100	1,778,750	Nov. 1905	1.00
Tenn. C. & I., pf	Tenn	248,000	2,480	100	355,284	Nov. 1905	2.00
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil	Cal	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal	10,000,000	100,000	100	1,118,766	May 1905	.50
Union National Gas	Pa.	9,000 000	90,000	100	1,260,000	Apr. 1905	2.00
U. S. Steel Corp., cm.	U. S.	550,000,000	5,083,025	100	53,360,978	Dec. 1903	1.50
U. S. Steel Corp., pf.	U. S.	360,281,100	3,603,141	100	137,013,070	Aug. 1905	1 75
Va. Carolina Ch., cm.	U. S.	38,000,000	279,844	100	3,678,829	June 1903	1.25
Va. Carolina Ch., pf.	U. S.	20,000,000	180,000	100	9,660,869	Oct. 1905	2.00
Westmoreland Coal	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Authorized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Carmen, g. s	Mex	27,500	1,100	25	117,437	Jan. 1905	2.37
Copiapo, c	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	121,486	25	968,947	Apr. 1904	2.50
Dominion Coal, com.	N. S.	15,000,000	150,000	100	1,050,000	Dec. 1903	1.75
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1905	4.00
Dos Estrellas g. s.	Mex	150,000	3,000	50	1,020,5 5	July 1905	13.65
El Oro, g. s	Mex	5,750,000	1,080,000	5	2,708,800	July 1904	.18
Esperanza, s. g.	Mex	2,275,000	455,000	5	1,486,349	May 1905	.12
Granby Con	B. C.	13,363,030	1,336,303	10	133,630	Dec. 1903	.10
Greene Con., copper.	Mex	8,640,000	864,000	10	3,403,200	Oct. 1905	.40
Greene Con., gold	Mex	5,000,000	500,000	10	300,000	July 1905	.20
Guggenheim Expl.	Mex	17,000,000	105,000	100	1,837,500	July 1905	1.75
LeRoi No. 2, g	B. C.	3,000,000	120,000	25	432,000	Oct. 1905	.24
N. Y. & Hond. Ros.	C. A.	1,500,000	150,000	10	2,062,500	Oct. 1905	.15
North Star	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	50,000	100	788,600	Nov. 1904	2.00
N. S. St. & Coal, pf.	N. S.	2,000,000	10,300	100	309,000	Apr. 1905	2.00
Penoles	Mex	.....	3,399,800	...	59,375	July 1905	23 75
Providence, g. s	B. C.	200,000	40,000	5	22,224	Oct. 1904	.10
Reco, g. s.l	B. C.	1,000,000	958,000	1	307,082	Apr. 1905	.02
Slocan Star	B. C.	500,000	500,000	1	575,000	Dec. 1904	.05
St. John del Rey, g.	Brazil	3,000,000	546,265	5	14,228,101	Dec. 1904	.12
St. Eugene Con	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tilt Cove, c	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.24
Tyee, c	B. C.	940,000	180,000	5	136,800	Dec. 1904	.48